

APPENDIX H
BIOLOGICAL RESOURCES

ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AFB	Air Force Base
AFI	Air Force Instruction
CFR	Code of Federal Regulations
dB	decibels
DoD	Department of Defense
EO	Executive Order
ESA	Endangered Species Act
FNAI	Florida Natural Areas Inventory
FWC	Florida Fish and Wildlife Conservation Commission
GIS	Geographic Information System
HE	High Explosive
INS	Invasive Nonnative Species
LE	Listed as Endangered
LS	Listed as a Species of Special Concern
LT	Listed as Threatened
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
NMFS	National Marine Fisheries Service
NRS	Natural Resources Section
PBG	Potential Breeding Group
RCW	Red-cockaded Woodpecker
ROI	Region of Influence
SAIC	Science Applications International Corporation
SRI	Santa Rosa Island
T(S/A)	Threatened due to Similarity in Appearance
U.S.	United States
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

BIOLOGICAL RESOURCES

The Endangered Species Act (ESA) of 1973 (16 U.S. Code [USC] 1531 to 1544) provides for the conservation of endangered and threatened species and the ecosystems on which they depend. Activities that may affect federally listed species require an ESA Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) if impacts to federally listed species are possible. USFWS/NMFS may agree that the activity is not likely to affect a listed species, or may suggest measures to mitigate adverse effects.

Air Force Instruction (AFI) 32-7064 provides details on how to manage natural resources in such a way as to comply with federal, state, and local laws and regulations. This AFI calls for the protection and conservation of state-listed species when not in direct conflict with the military mission. Eglin Air Force Base (AFB) applies for appropriate permits for actions that may affect state-listed species (such as monitoring and handling), and also cooperates with the Florida Fish and Wildlife Conservation Commission (FWC) to further the goals of the Florida State Wildlife Conservation Strategy.

The Bald Eagle Protection Act (16 USC 668–668d) prohibits the taking or possession of and commerce in bald eagles. Taking includes the pursuit, shooting, poisoning, wounding, killing, capture, collection, molesting, disturbance, or trapping of an eagle. The Act prohibits that anyone possess, sell, purchase, or transport a bald eagle, alive or dead, or any part, nest, or egg of these eagles at any time.

The Migratory Bird Treaty Act (MBTA) (16 USC 703-712; 1997-Supp) and Executive Order (EO) 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, protect migratory birds and their habitats and establish a permitting process for legal taking. The USFWS, at 50 Code of Federal Regulations (CFR) 20.11(a) defines 'migratory bird' as those migratory birds protected by treaties between the United States and foreign countries. A list of migratory birds protected by the international conventions and the MBTA appears at 50 CFR 10.13. Except as permitted, for normal and routine operations such as installation support functions, actions of the Department of Defense (DoD) may not result in pursuit, hunting, taking, capturing, killing, possession, or transportation of any migratory bird, bird part, nest, or egg thereof. The DoD must address these routine operations through the Memorandum of Understanding (MOU) developed in accordance with EO 13186 (DoD and USFWS, 2006). Under the 2003 National Defense Authorization Act, the Armed Forces are exempted from the incidental taking of migratory birds during military readiness activities, except in cases where an activity would likely cause a significant adverse effect on the population of a migratory bird species. As detailed in the *Federal Register* (69 FR 31074–31085), which amends 50 CFR Part 21, in this situation, the Armed Forces, in cooperation with the USFWS, must

develop and implement conservation measures to mitigate or minimize the significant adverse impacts (*Federal Register*, 2007).

Invasive nonnative species (INS) are species introduced from other countries or regions of the United States that threaten native plants and animals by altering the composition, structure, and function of native ecosystems. INS impose large economic costs on natural resource managers, requiring intensive and extensive management to prevent undesirable ecosystem changes. Recognizing the ecological and economic impacts of invasive species, the President of the United States issued EO 13112 *Invasive Species*, which states that each federal agency whose actions may affect the status of invasive species shall to the extent practicable:

- Prevent the introduction of invasive species,
- Detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner,
- Monitor invasive species populations accurately and reliably,
- Provide for restoration of native species and habitat conditions in ecosystems that have been invaded,
- Conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control, and
- Promote public education on invasive species.

EO 13112 states that no federal agency shall authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of INS in the United States or elsewhere.

EGLIN AFB SENSITIVE SPECIES

Table H-1 shows all of the Florida Natural Areas Inventory (FNAI) -tracked and state-and federally listed species present on or adjacent to Eglin AFB, excluding those species found on Santa Rosa Island (SRI). Only species that have the potential to be located on or within close proximity to the proposed alternative areas are identified; most of these species are found within the interstitial areas of Eglin AFB. Descriptions for species of particular concern at Eglin AFB are provided below. Additional information on the other species listed in Table H-1 is available in the *Eglin Military Complex Environmental Baseline Study Resource Appendices Volume 1—Eglin Land Test and Training Range* (U.S. Air Force, 2003).

Table H-1. State-listed, Federally Listed, and FNAI-tracked Species, Eglin AFB

Scientific Name	Common Name	Status	
		State	Federal
Fish			
<i>Acipenser oxyrinchus desotoi</i>	Gulf Sturgeon	LT	LT
<i>Awaous banana</i>	River Goby	—	—
<i>Etheostoma okaloosae</i>	Okaloosa Darter	LT	LT
<i>Pteronotropis welaka</i>	Bluenose Shiner	LS	—
Mussels			
<i>Hamiota australis</i>	Southern Sandshell	—	PE
<i>Fusconaia escambia</i>	Narrow Pigtoe	—	PT
<i>Ptychobranchius jonesi</i>	Southern Kidneyshell	—	PE
<i>Villosa choctawensis</i>	Choctaw Bean	—	PE
<i>Pleurobema strodeanum</i>	Fuzzy Pigtoe	—	PT
Amphibians and Reptiles			
<i>Alligator mississippiensis</i>	American Alligator	LS	T (S/A)
<i>Ambystoma bishopi</i>	Reticulated flatwoods salamander	LE	LE
<i>Amphiuma pholeter</i>	One-toed Amphiuma	—	—
<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake	—	—
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	LT	LT
<i>Eumeces anthracinus</i>	Coal Skink	—	—
<i>Gopherus polyphemus</i>	Gopher Tortoise	LT	LC
<i>Graptemys ernsti</i>	Escambia Map Turtle	—	—
<i>Hemidactylium scutatum</i>	Four-Toed Salamander	—	—
<i>Heterodon simus</i>	Southern Hognose Snake	—	—
<i>Hyla andersonii</i>	Pine Barrens Treefrog	LS	—
<i>Macrolemys temmincki</i>	Alligator Snapping Turtle	LS	—
<i>Pituophis melanoleucus mugitus</i>	Florida Pine Snake	LS	—
<i>Rana capito</i>	Gopher Frog	LS	—
<i>Rana okaloosae</i>	Florida Bog Frog	LS	—
Birds			
<i>Accipiter cooperii</i>	Cooper’s Hawk	—	—
<i>Aimphila aestivalis</i>	Bachman’s Sparrow	—	—
<i>Ardea alba</i>	Great Egret	—	—
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	LS	—
<i>Charadrius alexandrinus</i>	Snowy Plover	LT	—
<i>Charadrius melodus</i>	Piping Plover	LT	LT
<i>Charadrius wilsonia</i>	Wilson’s Plover	—	—
<i>Egretta caerulea</i>	Little Blue Heron	LS	—
<i>Egretta thula</i>	Snowy Egret	LS	—
<i>Elanoides forficatus</i>	Swallow-tailed Kite	—	—
<i>Eudocimus albus</i>	White Ibis	LS	—
<i>Falco sparverius paulus</i>	Southeastern American Kestrel	LT	—
<i>Haematopus palliatus</i>	American Oystercatcher	LS	—

Table H-1. State-listed, Federally Listed, and FNAI-tracked Species, Eglin AFB, Cont'd

Scientific Name	Common Name	Status	
		State	Federal
<i>Haliaeetus leucocephalus</i>	Bald Eagle	LT	—
<i>Pelecanus occidentalis</i>	Brown Pelican	LS	—
<i>Picoides borealis</i>	Red-cockaded Woodpecker	LS	LE
<i>Picoides villosus</i>	Hairy Woodpecker	—	—
<i>Rynchops niger</i>	Black Skimmer	LS	—
<i>Sterna antillarum</i>	Least Tern	LT	—
<i>Sterna caspia</i>	Caspian Tern	—	—
<i>Sterna maxima</i>	Royal Tern	—	—
<i>Sterna sandvicensis</i>	Sandwich Tern	—	—
Mammals			
<i>Peromyscus polionotus leucocephalus</i>	Santa Rosa Beach Mouse	—	—
<i>Trichechus manatus</i>	Manatee	LE	LE
<i>Ursus americanus floridanus</i>	Florida Black Bear	LT*	—
Plants			
<i>Andropogon arctatus</i>	Pine-Woods Bluestem	LT	—
<i>Asclepias viridula</i>	Southern Milkweed	LT	—
<i>Baptisia calycosa var villosa</i>	Pineland Wild Indigo	LT	—
<i>Calamintha dentata</i>	Toothed Savory	LT	—
<i>Calamovilfa curtissii</i>	Curtiss' Sand Grass	LT	—
<i>Calycanthus floridus var floridus</i>	Sweet Shrub	LE	—
<i>Carex baltzelli</i>	Baltzell's Sedge	LT	—
<i>Carex tenax</i>	Sandhill Sedge	—	—
<i>Chrysopsis godfreyi</i>	Godfrey's Golden Aster	LE	—
<i>Chrysopsis gossypina ssp cruiseana</i>	Cruise's Golden Aster	LE	—
<i>Cladium mariscoides</i>	Pond Rush	—	—
<i>Coelorachis tuberculosa</i>	Piedmont Jointgrass	LT	—
<i>Drosera intermedia</i>	Spoon-Leaved Sundew	LT	—
<i>Eleocharis rostellata</i>	Beaked Spikerush	LE	—
<i>Epigaea repens</i>	Trailing Arbutus	LE	—
<i>Hexastylis arifolia</i>	Heartleaf	LT	—
<i>Hymenocallis henryae</i>	Henry's Spider Lily	LE	—
<i>Ilex amelanchier</i>	Serviceberry Holly	LT	—
<i>Juncus gymnocarpus</i>	Coville's Rush	LE	—
<i>Kalmia latifolia</i>	Mountain Laurel	LT	—
<i>Lachnocaulon digynum</i>	Bogbuttons	LT	—
<i>Lilium catesbaei</i>	Pine Lily	LT	—
<i>Lilium iridollae</i>	Panhandle Lily	LE	—
<i>Lilium michauxii</i>	Carolina Lily	LE	—
<i>Lindera subcoriacea</i>	Bog Spice Bush	LE	—
<i>Linum westii</i>	West's Flax	LE	—
<i>Litsea aestivalis</i>	Pondspice	LE	—

Table H-1. State-listed, Federally Listed, and FNAI-tracked Species, Eglin AFB, Cont'd

Scientific Name	Common Name	Status	
		State	Federal
<i>Lupinus westianus</i>	Gulfcoast Lupine	LT	—
<i>Macranthera flammea</i>	Hummingbird Flower	LE	—
<i>Magnolia ashei</i>	Ashe's Magnolia	LE	—
<i>Magnolia pyramidata</i>	Pyramidal Magnolia	LE	—
<i>Malaxis unifolia</i>	Green Adder's-Mouth	LE	—
<i>Matela alabamensis</i>	Alabama Spiney Pod	LE	—
<i>Medeola virginiana</i>	Indian Cucumber-Root	LE	—
<i>Monotropa hypopithys</i>	Pine Sap	LE	—
<i>Myriophyllum laxum</i>	Piedmont Water-milfoil	—	—
<i>Nuphar luteum ssp ulvaceum</i>	West Florida Cow Lily	—	—
<i>Panicum nudicaule</i>	Naked-stemmed Panic Grass	LT	—
<i>Pinguicula lutea</i>	Yellow Butterwort	LT	—
<i>Pinguicula planifolia</i>	Swamp Butterwort	LT	—
<i>Pinguicula primuliflora</i>	Primrose-flowered Butterwort	LE	—
<i>Platanthera integra</i>	Southern Yellow Fringeless Orchid	LE	—
<i>Polygonella macrophylla</i>	Large-leaved Jointweed	LT	—
<i>Quercus arkansana</i>	Arkansas Oak	LT	—
<i>Rhexia parviflora</i>	Small-flowered Meadow Beauty	LE	—
<i>Rhexia salicifolia</i>	Panhandle Meadowbeauty	LT	—
<i>Rhododendron austrinum</i>	Orange Azalea	LE	—
<i>Rhynchospora crinipes</i>	Hairy-peduncled Beakrush	LE	—
<i>Rhynchospora stenophylla</i>	Narrow-leaved Beakrush	LT	—
<i>Sarracenia leucophylla</i>	White-top Pitcherplant	LE	—
<i>Sarracenia rubra</i>	Sweet Pitcherplant	LT	—
<i>Sideroxylon thornei</i>	Thorne's Buckthorn	LE	—
<i>Stewartia malacodendron</i>	Silky Camellia	LE	—
<i>Tephrosia mohrii</i>	Pineland Hoary Pea	LT	—
<i>Xanthorhiza simplicissima</i>	Yellow-root	LE	—
<i>Xyris longisepala</i>	Karst Pond Yellow-eyed Grass	LE	—
<i>Xyris scabrifolia</i>	Harper's Yellow-eyed Grass	LT	—
<i>Zigadenus leimanthoides</i>	Coastal Death Camas	LE	—

1 C = Candidate: species that will soon be listed as threatened or endangered

2 LE = Endangered: species in danger of extinction throughout all or a significant portion of its range.

3 LT = Threatened: species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

4 LS = Species of Special Concern: a species, subspecies, or isolated population that is facing a moderate risk of extinction in the future

7 T(S/A) = Threatened due to similarity of appearance to a species that is federally listed such that enforcement personnel have difficulty differentiating between the listed and unlisted species

9 — = Not currently listed, but tracked by FNAI due to rarity

10 * = State listed as LT but not applicable in Baker and Columbia Counties or the Apalachicola National Forest

Federally Listed Species

Okaloosa Darter

The Okaloosa darter (*Etheostoma okaloosae*) is a small federally and state-listed threatened fish. Spawning occurs from March to October, with the greatest amount of activity taking place during April (USFWS, 1998). The entire global population of this species is found in the tributaries and main channels of Toms, Turkey, Mill, Swift, East Turkey, and Rocky Creeks, which drain into two bayous of Choctawhatchee Bay. These seepage streams have persistent discharge of clear, sand-filtered water through sandy channels, woody debris, and vegetation beds. The Eglin Range contains 90 percent of the 457-square kilometer (176-square mile) drainage area. The remaining portions of the watershed are within the urban areas of Niceville and Valparaiso (U.S. Air Force, 2006).

The most immediate threat to the Okaloosa darter is loss of habitat through degradation of stream water quality from soil erosion into streams. The sources with high soil and sediment erosion probability are borrow pits, clay roads that cross streams, and a few test area sites where vegetation is maintained by using choppers on slopes. A 1992 study identified erosion from borrow pits and roads as major contributors to the degradation of darter habitat. Mission activities could avoid further degradation of stream quality by keeping vehicle activity and troop movement confined to trails, bridges, and roads and conducting ground-disturbing activities only outside of a 300-foot buffer around Okaloosa darter streams. These procedures are available to minimize sediment erosion into the darter watersheds (U.S. Air Force, 2006).

Due to a recovery plan that Eglin AFB implemented for the Okaloosa darter in 1998, the darter was recently downlisted from endangered status with the final rule becoming effective May 2, 2011. Eglin AFB is protecting instream flows and historical habitat through management plans, conservation agreements, easements, and/or acquisitions; is implementing an effective habitat restoration program to control erosion from roads, clay pits, and open ranges; is demonstrating that the Okaloosa darter population is stable or increasing and that the range of the Okaloosa darter has not decreased at all historical monitoring sites; and is seeing that no foreseeable threats exist that would impact the survival of the species.

Erosion control projects in darter watersheds were identified by erosion control program managers over the past 15 years and each project initiated landscape manipulation projects to decrease the amount of sedimentation entering the streams. The Eglin Natural Resources Section (NRS) has completed over 98 percent of all identified erosion control projects in darter watersheds and will soon be entering the maintenance phase (Pizzalato, 2010).

Flatwoods Salamander

The flatwoods salamander (*Ambystoma cingulatum*) is federally and state listed as endangered. Optimal habitat for this small mole salamander is open, mesic (moderately wet) woodlands of longleaf or slash pine flatwoods maintained by frequent fires and that contain shallow, ephemeral wetland ponds. Males and females migrate to these ephemeral ponds during the cool, rainy months of October through December. The females lay their eggs in vegetation at the edges of the ponds. Flatwoods salamanders may disperse long distances from breeding sites to upland sites where they live as adults (U.S. Air Force, 2006).

There are 18 known breeding ponds for the flatwoods salamander on the Eglin Range. Additionally, the Eglin Range supports approximately 17,000 acres of potential salamander habitat in mesic flatwoods.

The primary threat to the flatwoods salamander is loss of mesic habitat through the filling in of wetlands and other alterations to the landscape hydrology. Flatwoods salamander habitat is also threatened by the introduction of INS. Flatwoods salamanders and their active breeding wetlands both appear to have declined in number since the original Eglin surveys in 1993 and 1994. This is possibly due in part to several years of drought in the late 1990s and early 2000s. Breeding wetlands may not have remained wet long enough for larvae to complete metamorphosis if rainfall amounts were not sufficient. This has resulted in little population recruitment over the last decade at Eglin's wetlands (U.S. Air Force, 2006).

The USFWS guidelines in the *Federal Register* (64 FR 15691) establish a 450-meter (1,476-foot) buffer area from the wetland edge of confirmed breeding ponds. Within the buffer area, the guidelines restrict unlawful destruction or alteration of suitable pine flatwoods habitat in order to minimize the potential for direct impacts to salamanders, the introduction and spread of invasive, nonnative plant species, and alterations to hydrology and water quality.

Eastern Indigo Snake

The eastern indigo snake (*Drymarchon corais couperi*) is listed as a federal- and state-threatened species that is the largest nonvenomous snake in North America. The primary reason for its listing is population decline resulting from habitat loss and fragmentation. Movement along travel corridors between seasonal habitats exposes the snake to danger from increased contact with humans. Indigo snakes frequently utilize gopher tortoise burrows and the burrows of others species for over-wintering. The snake frequents flatwoods, hammocks, stream bottoms, riparian thickets, and high ground with well-drained, sandy soils. The indigo snake could occur anywhere on the Eglin Range because it uses such a wide variety of habitats (U.S. Air Force, 2006).

The species is extremely uncommon on the Eglin Range with the sighting of only 29 indigo snakes throughout the Eglin Range from 1956 to 1999, while no sightings have been reported since 1999 (Gault, 2009). Most of these snakes were seen crossing roads or after being killed by vehicles. It is difficult to determine a precise number or even estimate the number of these snakes due to the secretive nature of this species (U.S. Air Force, 2006).

Red-Cockaded Woodpecker

The red-cockaded woodpecker (RCW) (*Picoides borealis*) is listed as a federally and state-listed endangered bird species. The RCW excavates cavities in live longleaf pine trees that are at least 85 years old. The RCW historically had a habitat range as far north as New Jersey and as far west as Oklahoma. Today, the RCW has been restricted to the southeastern United States, from Florida to Virginia and to southeast Texas, due to a loss of habitat. In the southeast, 98 percent of the longleaf pine forests have been removed, making relatively undeveloped federal lands such as Eglin AFB primary habitat for the species. Due to the preservation of continuous longleaf pine forests on Eglin, the Eglin Range has one of the largest remaining populations of RCWs in the country. In 2003, the USFWS identified Eglin AFB as 1 of 13 primary core populations for the RCW (U.S. Air Force, 2006). Eglin's population goal is 350 Potential Breeding Groups (PBGs). The Eglin population has been increasing since 1994, and the current population has 420 active clusters and an estimated 371 PBGs.

The removal of longleaf pine trees, degradation of quality habitat, or noise generated from mission-related or other activities are potential threats to the RCW on the Eglin Range. Eglin is executing a USFWS-approved management strategy to meet certain growth objectives of the RCW and to obtain increased mission flexibility with the federal requirements for RCW impacts (U.S. Air Force, 2006).

The Eglin NRS Geographic Information System (GIS) database includes the locations of active RCW cavity trees (tree containing one or more cavities that are utilized by the RCW) and inactive RCW cavity trees (tree containing cavities that were once utilized by the RCW but have not shown recent activity). Inactive RCW cavities, which are defined as those cavities that were once utilized by the RCW but have not shown recent activity, are spatially recorded. The NRS also maps RCW foraging habitat around active clusters of RCW cavities in the GIS. The "Implementation Procedures for Use of Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: Second Revision," requires that if timber is to be removed within the modeled foraging habitat of active cavity trees, then a forage habitat analysis must be completed to determine potential impacts (U.S. DOI, 2005). Consultation will be required if resulting resources fall below USFWS

guidelines defined in Eglin's Threatened and Endangered Species Component Plan to the INRMP.

Freshwater Mussels

The southern sandshell (*Lampsilis australis*), fuzzy pigtoe (*Pleurobema strodeanum*), southern kidneyshell (*Ptychobranhus jonesi*), narrow pigtoe (*Fusconaia Escambia*), and Choctaw bean (*Villosa choctawensis*) freshwater mussels are federal candidates for listing as threatened or endangered species. These freshwater mussels are found only in the Yellow, Escambia, and Choctawhatchee River drainages in Florida and Alabama. From the 1990s to 2004, surveys have documented declines in the numbers of these candidate mussel species (Blalock-Herod et al., 2002; Pilarczyk et al., 2006). Furthermore, these surveys have been unable to capture many of these mussel species at sites where they were previously known to occur. These local extirpations and reductions in numbers are attributed to habitat alteration from various sources.

The greatest threat to these freshwater mussels is runoff associated with poor land use practices, such as poorly conducted agricultural or silvicultural practices, construction, and mining activities. Because of their limited motility, mussels are extremely vulnerable to acute, localized impacts (i.e., impoundment, runoff from adjacent unvegetated land) (Box and Mossa, 1999). Mussels filter fine particulate organic matter from the water, so excess sedimentation may interfere with feeding. Sedimentation may also cause direct mortality by deposition and suffocation, and turbidity may reduce or eliminate juvenile recruitment. Pesticides and other water quality issues also threaten the health of these filter feeders. Preferred habitats are creeks and rivers with slow to moderate currents and sandy substrates (NRCS, 2007).

State-Listed and Rare Species

Eglin AFB provides habitat for many state-listed and rare species in addition to the federally listed species described in the previous sections. AFI 32-7064 calls for the protection and conservation of state-listed species when not in direct conflict with the military mission. The conservation of state-listed species and other rare but unlisted species is encouraged and in some cases is critical to ensuring continued mission flexibility. Management actions conducted by Eglin for many of the federally listed species provide direct and indirect benefits to many state-listed and rare species. There are 67 state-listed threatened and endangered species found on Eglin. Most (55) of the 67 state-listed species are plants. An additional 17 animal species are not listed by the Florida FWC or the USFWS, but are tracked by the FNAI due to their rarity and/or declining population trends. Below are descriptions of some of the state-listed and rare animal species of particular concern at Eglin AFB.

Florida Black Bear

The Florida black bear (*Ursus americanus floridanus*) is currently listed as a state-threatened species except in Baker and Columbia Counties and in Apalachicola National Forest. Florida black bear populations are currently found in Florida and Georgia, and there is also a small population in Alabama. Eglin AFB is considered to be the smallest population, with an estimated 60 to 100 individuals; however, Eglin's black bear population has shown signs of increase since the early 1990s. Reasons for population declines include loss of habitat due to urban development and direct mortality due to collisions with vehicles. Black bear in Florida breed in June–July, and young are born in January–February. Most black bears within the Eglin Range utilize the large swamps and floodplain forests in the southwest and northern portions of the Eglin Range, where they feed on fruits, acorns, beetles, and yellow jackets. Black bear sightings have occurred at numerous locations throughout the Eglin Range, the majority of which have been within the interstitial areas (U.S. Air Force, 2006).

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald Eagle Protection Act and the MBTA. Eagles are territorial and exhibit a strong affinity for a nest site once a nest has been established. It is common for a breeding pair to rebuild damaged or lost nests in the same tree or in an adjacent tree. Individual pairs return to the same territory year after year and territories are often inherited by subsequent generations. The nesting period in the southeast United States extends from 1 October to 15 May with most nests completed by the end of November (U.S. Air Force, 2006). Most eagles migrate north during the hot summer season. Bald eagles nest at one location on Eglin Main Base between Cobbs Overrun and Test Area A-22, and on SRI near Test Site A-12. The pair of eagles at the Eglin Main Base site has fledged one to two birds per year in most years, but in some years no young were fledged (U.S. Air Force, 2006). Eglin AFB follows the USFWS National Bald Eagle Management Guidelines for the bald eagle in the Southeast Region (USFWS, 2007), and maintains a 1,500-foot protection buffer around the nest.

Gopher Tortoise

The gopher tortoise (*Gopherus polyphemus*) is a state-threatened species. It is also a federal “candidate” species. The tortoise is found primarily within the sandhills and open grassland ecological associations on the Eglin Range. Gopher tortoise burrows serve as important habitat for many species, including the federally listed eastern indigo snake (U.S. Air Force, 2006).

Dusky Gopher Frog

The Dusky gopher frog (*Rana capito*) is listed as a species of special concern by the state of Florida. These frogs are typically 2.5 to 4 inches long, excluding their legs, and have

a wide body characterized by cream-colored, gray, or brown blotches. Their chin and throat are spotted, and the belly is usually plain. The dusky gopher frogs prefer habitats of the Sandhills ecological association and are typically found in dry, sandy uplands. They are nocturnal and spend most of the day in tunnels or gopher tortoise burrows. Breeding occurs in ponds and other permanent water bodies. The dusky gopher frog is found throughout Florida, with the exception of the Everglades and the Keys.

Florida Bog Frog

The Florida bog frog (*Rana okaloosae*) a species of special concern by the state, can only be found within Walton, Okaloosa, and Santa Rosa Counties. Most of the habitat for the frog lies on Eglin AFB property with all known locations of the frog in small tributary streams of the Yellow, Shoal, and East Bay Rivers. There are 65 documented bog frog locations on the Eglin Range, but only 58 of those have been verified.

Florida Burrowing Owl

The Florida burrowing owl (*Athene cunicularia floridana*) is a small owl, measuring approximately 9 inches in length with a wingspread reaching 22 inches. They are typically most active during the morning or late afternoon and can be found in open habitats with short grass and few trees. Burrowing owls exhibit strong territory fidelity; they will remain on the same territory as long as the habitat meets their biological and reproductive needs. Burrowing owls will either create burrows, similar to gopher tortoise burrows, in order to keep avian predators from swooping down on them, or they will use abandoned gopher tortoise burrows. The burrowing owl is currently listed as a state species of special concern and is also protected under the MBTA.

Southeastern American Kestrel

The southeastern American kestrel (*Falco sparverius paulus*), a state-threatened species, is a common permanent resident of Eglin. This small raptor typically preys on small rodents, reptiles, and insects in clearings or woodland edges. The species can be found within the Sandhills and Open Grassland/Shrubland ecological associations, and may occur on or near any of the test areas at Eglin.

Florida Pine Snake

The Florida pine snake (*Pituophis melanoleucus mugitus*), a state species of concern, inhabits dry areas such as the longleaf pine, oak woodlands, and sand pine scrub communities found within the Sandhills ecological association. The species is physically adapted for digging into loosely packed sand. It also enters into rodent burrows and occasionally into gopher tortoise burrows.

Migratory Birds

Migratory birds pass through the Region of Influence (ROI), but neither Eglin nor Hurlburt is considered an important stopover area or concentration site for neotropical migratory birds in the spring or fall (Tucker et al., 1996). Breeding neotropical migrants at Eglin and Hurlburt are primarily found in riparian, hammock, and barrier island habitats. These areas can serve as temporary habitat for neotropical birds migrating to and from the Caribbean and South and Central America. Neotropical migrants are more common within the ROI during fall migration than spring migration (Tucker et al., 1996).

Ecological Assets

Ecological Associations

Four broad matrix ecosystems exist on Eglin AFB: Sandhills, Flatwoods, Wetlands/Riparian, and Barrier Island. The ecosystems are defined by floral, faunal, and geophysical similarities. Artificially maintained open grasslands/shrublands and urban/landscaped areas also exist on Eglin, primarily on test areas or Main Base. Although grasslands/shrublands and urban/landscaped areas are not true ecological associations, they are included in this section as land uses.

Sandhills Matrix

This system is the most extensive natural community type on the Eglin Range, accounting for approximately 78 percent or 362,000 acres of the base. Longleaf Pine Sandhills are characterized by an open, savanna-like structure with a moderate-to-tall canopy of longleaf pine, a sparse midstory of oaks and other hardwoods, and a diverse groundcover comprised mainly of grasses, forbs, and low-stature shrubs. Its structure and composition are maintained by frequent fires (every three to five years), that control hardwood, sand pine, and titi encroachment. Longleaf Pine Sandhills consist of a high diversity of species adapted to fire and the heterogeneous conditions that fires create. The dominant native grass species in Eglin Sandhills is either wiregrass or bluestem, depending on location. Sandhills are often associated with and grade into scrub, upland pine forest, xeric hammock, or slope forests. This matrix is also known as longleaf pine turkey oak, longleaf pine-xerophytic oak, longleaf pine-deciduous oak, or high pine (U.S. Air Force, 2007).

The functional significance of the Sandhills Matrix is to provide maintenance of regional biodiversity. As little as 5,000 acres of old-growth longleaf pine forest remains globally and Eglin's Sandhills contain more than any other forest in the world. The Eglin Range represents the largest and least fragmented longleaf pine ownership in the world, and has the best remaining stand of old-growth longleaf pine (U.S. Air Force, 2007).

Flatwoods Matrix

Pine flatwoods occur on flat, moderately well drained sandy soils with varying levels of organic matter, often underlaid by a hard pan. While the canopy consists of slash pine and longleaf pine, the understory varies greatly from shrubby to an open diverse understory of grasses and herbs. The primary environmental factors controlling vegetation type are soil moisture (soil type and depth to groundwater) and fire history. The average fire frequency in flatwoods is one to eight years, with nearly all of the plants and animals inhabiting this community adapted to recurrent fires. Home to numerous rare and endangered plants and animals, the Flatwoods Matrix plays a significant role in maintaining regional biodiversity. Eglin's more than 300 acres of old growth flatwoods are among the last remaining of such high quality (U.S. Air Force, 2007).

Wetlands/Riparian Matrix

Wetlands are extraordinarily important contributors to the health and diversity of the Eglin landscape. Riparian areas are generally found along a water feature such as a river, stream, or creek. Great diversity of invertebrate and fish species is found within the streams associated with these watersheds. At least 11 different plant community types are found within riparian areas of the Eglin Range. Streams are perennial, originating in the sandy uplands of the installation and fed by groundwater recharge. Flood events only occur during extreme rain events (e.g., hurricanes); otherwise, flows are relatively consistent. Temperatures fluctuate during the year and each day, being more constant near the headwaters. These seepage streams are moderately acidic. The specific types of Wetlands/Riparian Matrices found on or adjacent to the Eglin Range are depression wetlands, seepage slopes, and floodplain wetlands (U.S. Air Force, 2007).

Other Land Uses

Open Grasslands/Shrublands — Open Grasslands/Shrublands occur in areas of heavily disturbed Sandhills, Flatwoods, and Wetlands/Riparian ecological sites. This habitat predominantly occurs within the test areas on Eglin AFB. Grasses and low shrubs characterize open Grassland/Shrubland areas. Eglin maintains this habitat with machinery or fire that removes or prevents future growth.

Urban/Landscaped Areas — Eglin AFB currently has approximately 46,000 acres of semi-improved areas and 14,000 acres of improved areas. Bahia grass (*Panicum notatum*) is the primary turf grass that is used in the semi-improved areas while St. Augustine grass (*Stenotaphrum secundatum*) and Centipede grass (*Eremochloa ophiuroides*) are the primary turf grasses used in the improved areas. Ground maintenance encourages low-maintenance landscaping and uses native plants whenever possible (U.S. Air Force, 2007).

Flora and Fauna of Ecological Associations

Table H-2 provides a summary of some of the plant and animal species commonly found within the ecological associations described above. The list is not a comprehensive inventory of the species found within these ecological associations; the table provides a reference summary.

Table H-2. Typical Plant and Animal Species of Eglin AFB by Ecological Association

Plants		Animals	
Common Name	Scientific Name	Common Name	Scientific Name
Sandhills Ecological Association			
Longleaf Pine	<i>Pinus palustris</i>	Red-cockaded Woodpecker	<i>Picoides borealis</i>
Turkey Oak	<i>Quercus laevis</i>	Bobwhite Quail	<i>Colinus virginianus</i>
Blackjack Oak	<i>Q. marilandica</i>	Great Horned Owl	<i>Bubo virginianus</i>
Bluejack Oak	<i>Q. incana</i>	Gopher Tortoise	<i>Gopherus polyphemus</i>
Wiregrass	<i>Aristida stricta</i>	Indigo Snake	<i>Drymarchon corais</i>
Saw Palmetto	<i>Serona repens</i>	Diamondback Rattlesnake	<i>Crotalus adamanteus</i>
Bracken Fern	<i>Pteridium aquilinum</i>	Six-lined Racerunner	<i>Cnemidophorus sexlineatus</i>
Blueberry	<i>Vaccinium</i> spp.	Florida Black Bear	<i>Ursus americanus floridanus</i>
Yaupon	<i>Ilex vomitoria</i>	Fox Squirrel	<i>Sciurus niger</i>
Gallberry	<i>Ilex glabra</i>	Least Shrew	<i>Cryptodius parva</i>
Gopher Apple	<i>Licania michauxii</i>	Cottontail Rabbit	<i>Sylvilagus floridanus</i>
Blackberry	<i>Rubus cuneifolius</i>	Pocket Gopher	<i>Geomys pinetus</i>
Sand Pine	<i>Pinus Clausa</i>	White-tailed Deer	<i>Castor canadensis</i>
Pine-woods Bluestem	<i>Andropogon arctatus</i>	Feral Pig	<i>Sus scrofa</i>
Wiregrass	<i>Aristida stricta</i>	Raccoon	<i>Procyon lotor</i>
Flatwoods Ecological Association			
Longleaf Pine	<i>Pinus palustris</i>	Wood Duck	<i>Aix sponsa</i>
Runner Oak	<i>Quercus pumila</i>	Red-winged Blackbird	<i>Agelaius phoenicius</i>
Saw Palmetto	<i>Serona repens</i>	Cotton Mouth	<i>Agkistrion piscivorus</i>
St. John's Wort	<i>Hypericum brachyphyllum</i>	Flatwoods salamander	<i>Ambystoma cingulatum</i>
Slash Pine	<i>Pinus elliotii</i>	River Otter	<i>Lutra canadensis</i>
Black Titi	<i>Cliftonia monophylla</i>	Beaver	<i>Castor canadensis</i>
Milkweed	<i>Asclepias humistrata</i>	Florida Black Bear	<i>Ursus americanus floridanus</i>
Pitcherplant	<i>Sarracenia</i> spp.	Gray Fox	<i>Urocyon cinereoargenteus</i>
Wetland and Riparian Ecological Association			
Yellow Water Lilly	spp.	Raccoon	<i>Procyon lotor</i>
Saw Grass	<i>Cladium jamaicensis</i>	Florida Black Bear	<i>Ursus americanus floridanus</i>

Table H-2. Typical Plant and Animal Species of Eglin AFB by Ecological Association, Cont'd

Plants		Animals	
Common Name	Scientific Name	Common Name	Scientific Name
Cattail	<i>Typha domingensis</i>	Sherman's Fox Squirrel	<i>Sciurus niger shermani</i>
Phragmites	<i>Phragmites australis</i>	American Alligator	<i>Alligator mississippiensis</i>
White Cedar	<i>Chamaecyparis thyoides</i>	Pine Barrens Tree Frog	<i>Hyla andersonii</i>
Water Tupelo	<i>Nyssa biflora</i>	Five-lined Skink	<i>Eumeces fasciatus</i>
Pitcher Plant	<i>Sarracenia purpurea</i>	Green Anole	<i>Anolis carolinensis</i>
Red Titi	<i>Cyrtilla racemiflora</i>	Garter Snake	<i>Thamnophis sirtalis</i>
Tulip Poplar	<i>Liriodendron tulipifera</i>	Indigo Snake	<i>Drymarchon corais</i>
Sweet Bay Magnolia	<i>Magnolia virginiana</i>	American Beaver	<i>Castor canadensis</i>
Red Bay	<i>Persea borbonia</i>	Parula Warbler	<i>Parula americana</i>

Sensitive Habitats

High-Quality Natural Communities

Eglin's contribution to southeastern conservation is evident in its extraordinary biodiversity and the exemplary quality of its many remnant natural communities. While the greater part of the installation is globally significant due to its biodiversity, specific areas have been designated "High-Quality Natural Communities" due to their exceptional high quality or the presence of rare species. These areas were identified by the FNAI through a project funded by the DoD Legacy Resource Management Program. These areas are distinguished by the uniqueness of the community, ecological condition, species diversity, and/or presence of rare species. These high-quality areas, totaling 75,266 acres and covering approximately 16 percent of the installation, are tangible examples of the successful restoration actions of Eglin NRS and the compatibility of these communities with most mission activities.

Outstanding Natural Areas

From the High-Quality Natural Communities FNAI identified, 17 larger-scale landscapes containing complexes of these high quality areas and locations of rare species were named Outstanding Natural Areas, and are listed below (U.S. Air Force, 2007):

- 1) Test Area A-77 Outstanding Natural Area
- 2) Alaqua-Blount Creek Confluence
- 3) Alice Creek
- 4) Boiling Creek-Little Boiling Creek
- 5) Brier Creek
- 6) East Bay Flatwoods and Scrub Mosaic

- 7) Live Oak Creek
- 8) Lower Weaver River
- 9) Patterson Outstanding Natural Area and Extension
- 10) Piney Creek
- 11) Prairie Creek
- 12) SRI
- 13) Scrub Pond
- 14) Spencer Flats Wetlands
- 15) White Point
- 16) Whitmier Island
- 17) Yellow River Basin

Significant Botanical Sites

FNAI also identified 15 Significant Botanical Sites that support rare plants on Eglin; they are listed below.

- 1) East Bay Savannahs
- 2) Patterson Natural Area Expansion
- 3) SRI
- 4) Blue Spring Creek Lakes
- 5) Malone Creek
- 6) Titi Creek Wilderness Area
- 7) Live Oak Creek
- 8) Turkey Gobbler Creek Cypress Swamp
- 9) Turkey Hen Creek Swamp
- 10) Boiling Creek and Little Boiling Creek
- 11) Hick's Creek Prairie
- 12) Whitmier Island
- 13) Brier Creek
- 14) Hickory Branch Hardwood Forest
- 15) Piney Creek

1 Large portions of the Outstanding Natural Areas and the Significant Botanical Sites
2 overlap. Combined, both of these areas total 43,210 acres, or approximately 9 percent of
3 the installation (U.S. Air Force, 2007).

4 ***Gulf Sturgeon Critical Habitat***

5 The USFWS designated Gulf sturgeon critical habitat in 2003 in multiple Gulf of Mexico
6 rivers, bays, and the Gulf itself. Federally designated critical habitat is defined as a
7 specific area that contains physical or biological features essential to a species'
8 conservation and that may require special management considerations or protection.
9 As it pertains to the Eglin Range, Choctawhatchee Bay (including the main body of
10 Choctawhatchee Bay, Hogtown Bayou, Jolly Bay, Bunker Cove, and Grassy Cove, and
11 excluding all other bayous, creeks, and rivers at their mouths/entrances), Santa Rosa
12 Sound, Yellow River, Shoal River, Blackwater Bay, East Bay, and the Gulf of Mexico out
13 to 1 nautical mile offshore of SRI have been designated as critical habitat. The lower
14 rivers provide summer resting and migration habitat, and the bays, sound, and Gulf
15 contain winter feeding and migration habitat (U.S. Air Force, 2006).

16 **Invasive Nonnative Species Management**

17 INS includes plants, animals, insects, diseases, and other organisms that are becoming
18 established and spreading at an alarming rate throughout the world. An invasive
19 species can be defined as a species that is nonnative to an ecosystem and whose
20 intentional or accidental introduction causes or is likely to cause environmental or
21 economic damage or harm to human health.

22
23 The Eglin AFB INS Management Program focuses on invasive nonnative plant and
24 animal species that cause or may cause negative environmental impacts to Eglin
25 ecosystems. Some of the main INS of concern are Chinese tallow, cogon grass, Japanese
26 climbing fern, Chinese privet, torpedo grass, feral pigs, and feral cats. The program's
27 purpose is to protect the integrity of Eglin's natural ecosystems by reducing and
28 controlling the spread of INS. The plan includes a recommendation to limit foot traffic
29 and vehicle traffic in areas where INS are present to prevent the spread of the invasive
30 and exotic species. Equipment moving through these areas needs to be washed so that
31 all seedlings are removed before the equipment is transferred to a non-contaminated
32 area. Standard operating procedures dictate that all vehicles are cleaned prior to use,
33 which would lessen or eliminate the potential for the spread of INS.

NOISE IMPACTS ON DOMESTIC ANIMALS AND WILDLIFE

Analysis Discussion. Many mission components of the Proposed Action are already occurring at Eglin AFB, and have been for several years, including low-level aircraft flights, use of flares, and HE (high-explosive) and non-HE ordnance training. Therefore, military noise is already a component of the existing sound environment within which several threatened and endangered species occur. Since noise generated under the Proposed Action would be similar to the existing condition, the potential for increased effects to federally and state-listed sensitive species would be low.

Most commonly, the reaction of birds and wildlife to aircraft noise, particularly when the aircraft is visible to the animal, is some degree of startle response—one response being flushing (i.e., abruptly leaving a nest; Gladwin et al., 1988). In this case, an animal could theoretically leave its nest open to predation, thereby reducing reproductive success (Larkin, 1996). For a sensitive species with an already threatened existence, any additional decrease in reproductive success could detrimentally affect the population; studies noted effects on reproductive success for some species but not for others (Larkin, 1996).

The most visible protected species, from a conservation program standpoint, is the RCW. Other protected species are just as important but are either not as susceptible to noise (e.g., Okaloosa darter) or not as numerous (e.g., bald eagle and black bear). Thus, this discussion focuses on impacts to birds from noise.

To understand potential impacts to birds from noise, and given that a lot of noise information is expressed in terms of human-hearing impact thresholds, a brief explanation of some differences between bird and human hearing is warranted. Figure H-1 is a diagram of a hearing audiogram of humans and birds. This audiogram represents the sound level in unweighted decibels (dB) and the frequency range of humans and birds, offering some insight into a few differences. The average bird, woodpecker, or owl does not hear low-frequency sounds (e.g., rumbles) as well as humans or frequencies on the high end of the audiogram. Some have a greater range in terms of being able to hear softer sounds—owls can hear sounds we cannot—and appear to tolerate, or rather are sensitive to, higher dB levels at mid and high frequencies. This may be an important consideration when assessing noise impacts to birds from explosions or sonic booms that have a lot of energy in the lower frequencies; however, it is clear that not enough is known on the subject of how human thresholds can be accurately applied to birds or other wildlife.

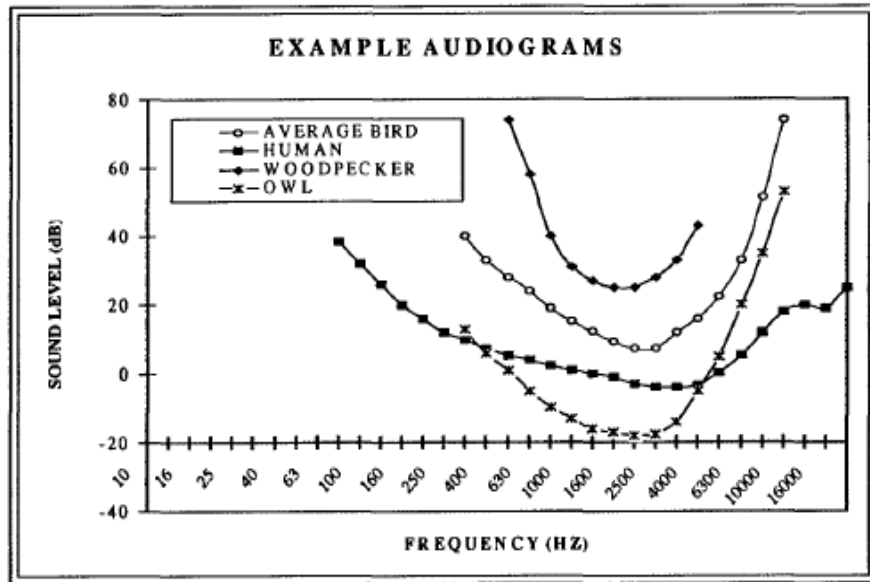


Figure H-1. Comparison of Human and Bird Hearing Sensitivities

(Source: Delaney, et al., 2002)

The structure of the human ear is often compared with wildlife ears to understand whether similarities in hearing ability exist. Scientists have measured the hearing range and frequencies of birds and people and found some similarities in function and ability (Okanoya and Dooling, 1987). Major differences include the ability of some birds to regenerate damaged hair cells within the inner ear, something humans cannot do (Dooling and Dent, 2001). The tolerance of the human body (e.g., the lungs) to blast overpressure is often used to estimate blast impact thresholds for other mammals in the absence of reliable data and vice-versa (Yelverton et al., 1973).

There are many studies describing wildlife reaction to aircraft noise, but little information is available that directly studies the impacts of impulsive bomb noise and blast on terrestrial wildlife. Delaney et al. (2002) studied the effects (i.e., flushing response) of several types of military noise, but not bomb noise, on RCWs. Artillery and grenade simulators were studied and, like bomb blasts, are impulsive. Due to the lack of information on wildlife and bomb blast effects, the impulse noise impact thresholds used in many environmental analysis documents are not specific to a given species or class of animal. Human thresholds are most often used when animal thresholds are lacking. What is known about humans is often applied to solve noise analysis problems regarding wildlife.

Another component of animal reaction to noise that is sometimes observed is habituation, which is a lack of response to a particular stimulus, learned over time (Larkin, 1996). Research indicates that not all species habituate to noise at the same rate, and some may always exhibit a startle response to noise (Larkin, 1996). With the exception of the bald eagle and the RCW, no specific documentation exists on the

response of species that occur at Eglin AFB to low-level aircraft and small-caliber weapons noise.

One study noted that a greater percentage of black brants (a type of goose) took flight in response to the presence of humans, eagles, and boats than to the presence of jets, propeller aircraft, and gunshots (Manci et al., 1988). Rotary aircraft typically cause a greater startle response than fixed-wing aircraft. In general, human presence and natural predators caused startle responses more often than noise (Manci et al., 1988). Animal reaction to noise has been shown to vary with species (Manci et al., 1988). Not all species acclimate or habituate to noise at the same rate, and some species may never habituate (Manci et al., 1988).

Eglin AFB Federally Protected Species

Red-cockaded Woodpecker. Delaney et al. (2002) found that military training exercises of short duration (less than two hours) conducted near active RCW cavity trees will not significantly affect the ability of the individuals to successfully reproduce. Activity longer than two hours was not tested. Results are only applicable to military training activities with similar levels of noise, frequency, and number of events and disturbance distance as that used in the study. In general, the authors concluded that “military maneuver training noise is not a limiting factor in the recovery of RCWs on military installations,” as evidenced by an increase in RCWs over the duration of the study, but that land management practices are vital to improving RCW habitat quality on military lands.

Delaney et al. (2002) recorded noise levels during several types of military training events and conducted experiments on small-arms (.50-caliber blanks) and artillery noise. A summary of observations from the study is provided in Table H-3.

Table H-3. Summary of RCW Flush Response Relative to Noise Source Distance and Loudness

Noise Source	No Flush Response Observed		Notes
	Distance (m)	SEL	
Noise Experiment Observations			
Small Arms (.50-cal blank)	>152.4	<80	Birds returned to nest an average of 6.3 min after noise ceased. Longest flush time was 26.8 min.
Artillery	>152.4	<72	Birds returned to nest an average of 4.4 min after noise ceased. Longest flush time was 16.2 min.
Passive Monitoring			
Small Arms (5.56- and .50 -cal blank)	>400	<76	Unable to test at <400 m. Supersonic bullet noise louder than muzzle blast noise in 1- to 4-kHz frequency range.
Large Cal (≥20 mm)	>700	<102	Unable to test at <500 m.

Table H-3. Summary of RCW Flush Response Relative to Noise Source Distance and Loudness, Cont'd

Noise Source	No Flush Response Observed		Notes
	Distance (m)	SEL	
Missiles (Multiple Launch Rocket System)	>750	<69	Unable to test at <750 m. Only one noise event monitored.
Helicopters	>30	<102	Observations applicable to RCW incubation and early brooding phase.
Fixed-wing Aircraft	>600	<90	Unable to test at < 600 m.
Vehicles (convoy of Bradley Fighting Vehicles and Civilian Vehicles)	>50	<75	Bird returned after 10 min after convoy had passed. Birds returned after 3 min when civilian vehicle had passed.
Simulators (Grenade)	>200	<82	Unable to test at < 100 m. A bird returned to nest within 8 min after flushing.

Source: Delaney et al., 2002

kHz = kilohertz; m = meter; cal = caliber; min = minutes; mm = millimeters; SEL = Sound Exposure Level in unweighted decibels; < = less than; > = greater than; ≥ = greater than or equal to

Bald Eagle. Bald eagle response in one study (Larkin, 1996) was primarily related to the proximity of a disturbance, such as a person or aircraft, rather than to a particular noise. In other words, eagle response was related more to a visual presence. There is one known bald eagle nest at Eglin AFB, near A-22 south of Eglin Main Base cantonment area. This nest is currently exposed to aircraft noise from the runway at approximately 65 dB DNL (A-weighted Day-Night Average Noise Level). It should be noted that the DNL metric is designed for assessment of noise impacts on humans. Under the Proposed Action, noise levels at the nest would increase to 75 dB DNL. While this is a marked increase, the degree of impact cannot be discerned since the literature provides no insight with regard to noise effects to birds from average noise. Additionally, A-weighted noise measures may not be appropriate for determining impacts to birds since some of the frequency bands emphasized by the weighting procedure are specific to humans (Delaney et al., 2002).

Indigo Snake. Indigo snakes occur on Eglin AFB and may inhabit gopher tortoise burrows, which are common in upland habitats. Some reptiles and amphibians exhibit a response to low-frequency noise and may experience a temporary decrease in hearing sensitivity after prolonged exposure to 95 dB (Manci et al., 1988). The noise levels to which indigo snakes would be exposed from the Proposed Action and Alternatives are unknown, but the nature of missions is such that any exposure is expected to be temporary. Noise from the Proposed Action and Alternatives may affect, but would not be likely to adversely affect, the indigo snake.

Reticulated Flatwoods Salamander. Amphibians do not exhibit a well-developed acoustic startle response and are often regarded as non-susceptible to noise impacts (Manci et al., 1988). In addition, this species lives in moist soil, leaf litter, and at times in

ponds, which would have some dampening effects on noise and vibration. Thus, noise from the Proposed Action and Alternatives would not be likely to adversely affect the flatwoods salamander.

State-Listed Species

Southeastern American Kestrel. Kestrels are a type of raptor or predatory bird. Research on noise and predatory birds indicates these types of birds are less likely to startle or flush from noise than other types of birds, such as songbirds. Low response was observed in nesting ospreys (Trimper et al., 1998). Red-tailed hawks exhibited habituation to helicopter noise (Andersen et al., 1989). In general, Mancini et al. (1988) found that most raptors did not exhibit a negative response to low-level overflights.

Florida Black Bear. Black bears use a variety of swamp, hammock, and forest habitats on Eglin AFB. It is likely that black bears are already being exposed to noise from low-level aircraft and small-caliber weapons, given its distribution on Eglin AFB. Noise associated with the Proposed Action and Alternatives would not be expected to adversely affect the black bear.

Gopher Tortoise. Gopher tortoises occur throughout the base on the training areas and in the interstitial areas. There are no noise criteria or thresholds for hearing impacts to this species, though Bowles et al. (1999) studied sonic boom effects on the desert gopher tortoise. For occasional exposures to sonic booms, Bowles et al. found that desert gopher tortoise hearing was not affected, but they did caution against daily repeated exposures. Bomb events, like sonic booms, are impulsive in nature and create the potential for greater effects due to the larger overpressures and associated heat and other blast effects. Given that any new missions associated with the Proposed Action and Alternatives would use existing test ranges, no new impacts to gopher tortoise are anticipated.

Summary of Noise Impacts on Animals

Low-level fixed-wing and rotary aircraft flights and small-caliber weapons noise can startle federally and state-listed species. A startle or escape response by itself is not necessarily detrimental to a species, nor is reaction to aircraft noise alone enough to imply adverse effects.

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature, and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Aircraft noise may mask or interfere with these functions. Secondary effects may include non-auditory effects similar to those exhibited by humans: stress, hypertension, and other nervous

disorders. Tertiary effects may include interference with mating and resultant population declines.

Few studies or reports include any reliable measures of the actual noise levels involved. However, in the absence of definitive data on the effect of noise on animals, the Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) of the National Research Council has proposed that protective noise criteria for animals be taken to be the same as for humans (CHABA, 1977).

Animals react to a variety of external stimuli, including each other. The types of startle responses that could be detrimental are repeated interruptions of nesting or breeding or abandonment of young. The activity scenarios of the alternatives are intermittent overflights and strafing, small-arms noise, artillery, vehicle noise, and HE bomb noise—activities that have been ongoing at Eglin AFB for some time. It may be assumed, therefore, that some species at Eglin AFB may be, or may become, acclimated to these sources of noise.

REFERENCES

- Andersen, D. E., O. J. Rongstad, and W. R. Mytton, 1989. Response of nesting red-tailed hawks to helicopter overflights. *Condor*, Vol 91, pp 296-299.
- Blalock-Herod, H. N., J. J. Herod, and J. D. Williams, 2002. Evaluation of Conservation Status, Distribution, and Reproductive Characteristics of an Endemic Gulf Coast Freshwater Mussel, *Lampsilis australis*. *Biodiversity and Conservation*, Vol 11, pp 1877-1887.
- Bowles, A. E., S. Eckert, L. Starke, E. Berg, L. Wolski, and J. Matesic, Jr., 1999. Effects of flight noise from jet aircraft and sonic booms on hearing, behavior, heart rate, and oxygen consumption of desert tortoise (*Gopherus agassizii*). AFRL-HE-WP-TR-1999-0170. Sea World Research Institute, Hubbs Marine Research Center, San Diego, CA, 131 pp.
- Box, J. B., and J. Mossa, 1999. Sediment, Land Use, and Freshwater Mussels: Prospects and Problems. *Journal of the North American Benthological Society*, Vol 18, No 1 (March 1999), pp 99-117.
- Delaney, D. K., L. L. Pater, R. H. Melton, B. A. MacAllister, R. J. Dooling, B. Lohr, B. F. Brittan-Powell, L. L. Swindell, T. A. Beaty, L. D. Carlile, and E. W. Spadgenske. 2002. Assessment of Training Noise Impacts on the Red-cockaded woodpecker: Final Report. U.S. Army Corps of Engineers Construction Engineering Research Laboratory, Champaign, IL.

- 1 Dooling, R. J., and M. L. Dent, 2001. New Studies on Hair Cell Regeneration in Birds.
2 *Acoustical Science and Technology*, Vol 22, No 2, Department of Psychology,
3 University of Maryland, College Park, MD.
- 4 *Federal Register*, 2006. Notice: Memorandum of Understanding Between the U.S.
5 Department of Defense and the U.S. Fish and Wildlife Service to Promote the
6 Conservation of Migratory Birds. *Federal Register*, Vol 71, No 168, pp 51580–51585.
7 August 30, 2006.
- 8 *Federal Register*, 2007. Migratory Bird Permits; Take of Migratory Birds by the Armed
9 Forces. Final Rule. Department of the Interior, Fish and Wildlife Service. 50 CFR
10 Part 21, Vol 72, No 39. February 28, 2007.
- 11 Gault, K., 2009. Personal communication between Kathy Gault, Eglin Natural
12 Resources Section, Wildlife, and Stephanie Hiers, SAIC. January 2009
- 13 Gladwin, D. N., K. M. Mancini, and R. Vilella, 1988. Effects of Aircraft Noise and Sonic
14 Booms on Domestic Animals and Wildlife: Bibliographic Abstracts. U. S. Fish and
15 Wildlife Service, National Ecology Research Center. NERC-88/29. AFESC TR 88-14.
16 78 pp. Companion document to Mancini et al., 1988.
- 17 Larkin, R. P., 1996. Effects of Military Noise on Wildlife: A Literature Review,
18 USACERL Technical Report 96/21, January, Center for Wildlife Ecology, Illinois
19 Natural History Survey, Champaign, IL.
- 20 Mancini, K. M., D. N. Gladwin, R. Vilella, and M. G. Cavendish, 1988. Effects of Aircraft
21 Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis.
22 Prepared by the U.S. Fish and Wildlife Service, National Ecology Research Center,
23 AFESC TR 88-14. 88 pp
- 24 Natural Resources Conservation Service (NRCS), 2007. Native Freshwater Mussels.
25 Fish and Wildlife Habitat Management Leaflet, No 46. January 2007.
- 26 Okanoya, K., and R. J. Dooling, 1987. Hearing in Passerine and Psittacine Birds: A
27 Comparative Study of Absolute and Masked Auditory Thresholds. *Journal of*
28 *Comparative Psychology*, Vol 101, pp 7–15.
- 29 Pilarczyk, M. M., P. M. Stewart, D. N. Shelton, H. N. Blalock-Herod, and J. D. Williams,
30 2006. Current and Recent Historical Freshwater Mussel Assemblages in the Gulf
31 Coastal Plains. *Southeastern Naturalist*, Vol 5, No 2, pp 205–226
- 32 Pizzalato, W., 2010. Personal communication via interview between William Pizzalato,
33 Eglin Natural Resources Section, Erosion Control Project Manager, and Mike
34 Nunley, SAIC. 3 June 2010.

- 1 Trimper, P. G., N. M. Standen, L. M. Lye, D. Lemon, T. E. Chubbs, and G. W.
2 Humphries, 1998. Effects of Low-level Jet Aircraft Noise on the Behavior of Nesting
3 Osprey. *Journal of Applied Ecology*, Vol 35, pp 122-130.
- 4 Tucker, J. W., G. E. Hill, and N. R. Holler, 1996. Distribution of Nearctic-Neotropical
5 Migrant and Resident Bird Species Among Habitats at Eglin and Tyndall Air Force
6 Bases, Florida. Alabama Cooperative Fish and Wildlife Research Unit, Auburn
7 University.
- 8 U.S. Air Force, 2003. Eglin Military Complex Environmental Baseline Study Resource
9 Appendices Volume 1 – Eglin Land Test and Training Range.
- 10 U.S. Air Force, 2006. Threatened and Endangered Species Component Plan, Eglin AFB,
11 FL. 96 CEG/CEVSN
- 12 U.S. Air Force, 2007. Integrated Natural Resources Management Plan, Eglin AFB, FL.
13 96 CEG/CEVSN.
- 14 U.S. Air Force, 2009. Final Erosion Control Component Plan. Eglin AFB Natural
15 Resources Forestry Section.
- 16 U.S. Department of the Interior (DOI), 2005. "Implementation Procedures for Use of
17 Foraging Habitat Guidelines and Analysis of Project Impacts under the Red-
18 cockaded Woodpecker (*Picoides borealis*) Recovery Plan: Second Revision," provides
19 implementation guidance for use of the foraging habitat standards presented in the
20 RCW recovery plan. 20 May 2005
- 21 United States Fish and Wildlife Service (USFWS), 1998. Okaloosa darter (*Etheostoma*
22 *okaloosae*) Recovery Plan (Revised). Atlanta, GA 42 p.
- 23 United States Fish and Wildlife Service (USFWS), 2007. National Bald Eagle
24 Management Guidelines. May, 2007.
- 25 Yelverton, J. T., 1973. Safe Distances From Underwater Explosions for Mammals and
26 Birds. AD-766 952. Prepared for the Defense Nuclear Agency by Lovelace
27 Foundation for Medical Education and Research, Albuquerque, NM.
28

This page is intentionally blank.

1
2

**EXCERPT FROM THE FEIS:
ESA SECTION SEVEN CONSULTATION**

This page is intentionally blank.

Appendix H

Biological Resources

**EGLIN AIR FORCE BASE
Florida**

**U.S. FISH AND WILDLIFE
SERVICE**

**FINAL
FORMAL ESA SECTION SEVEN
CONSULTATION FOR
2005 BRAC DECISIONS AND
RELATED ACTIONS AT
EGLIN AFB, FL**

JANUARY 2008

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-99

Biological Resources

Appendix H



PRINTED ON RECYCLED PAPER

H-100

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

TABLE OF CONTENTS

	<u>Page</u>
List of Tables.....	ii
List of Figures.....	iii
Acronyms, Abbreviations, and Symbols.....	iv
1. INTRODUCTION.....	1-1
2. DESCRIPTION OF PROPOSED ACTION.....	2-1
2.1 7SFG(A) Proposed Action.....	2-1
2.1.1 7SFG(A) Cantonment Area.....	2-1
2.1.2 7SFG(A) Range Training.....	2-6
2.2 JSF Program Proposed Action.....	2-15
2.2.1 JSF IJTS.....	2-15
2.2.2 JSF Flight Training.....	2-18
3. BIOLOGICAL INFORMATION.....	3-1
3.1 Federally Listed Species.....	3-1
3.1.1 Gulf Sturgeon.....	3-1
3.1.2 Okaloosa Darter.....	3-3
3.1.3 Flatwoods Salamander.....	3-3
3.1.4 Piping Plover.....	3-6
3.1.5 Red-cockaded Woodpecker.....	3-9
3.1.6 Eastern Indigo Snake.....	3-9
3.1.7 Sea Turtles.....	3-13
3.1.8 Perforate Lichen.....	3-18
3.1.9 Freshwater Mussels.....	3-18
3.2 Other Species Considered.....	3-19
3.2.1 Gopher Tortoise.....	3-19
3.2.2 Florida Black Bear.....	3-19
3.2.3 Santa Rosa Beach Mouse.....	3-19
3.2.4 Florida Bog Frog.....	3-19
3.2.5 Dusky Gopher Frog.....	3-20
3.2.6 Pine Barrens Tree Frog.....	3-20
3.2.7 Florida Pine Snake.....	3-20
3.2.8 Shorebirds and Wading Birds.....	3-20
3.2.9 Bald Eagle.....	3-21
3.2.10 Southeastern American Kestrel.....	3-21
4. DETERMINATION OF IMPACTS.....	4-1
4.1 Federally Listed Species.....	4-2
4.1.1 Gulf Sturgeon.....	4-2
4.1.2 Gulf Sturgeon Critical Habitat.....	4-2
4.1.3 Okaloosa Darter.....	4-2
4.1.4 Flatwoods Salamander.....	4-3
4.1.5 Piping Plover.....	4-5
January 2008	i
Formal ESA Section Seven Consultation for 2005 BRAC Decisions and Related Actions at Eglin Air Force Base, Florida	

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-101

Biological Resources

Appendix H

TABLE OF CONTENTS, CONT'D

	<u>Page</u>
4.1.6 Piping Plover Critical Habitat	4-6
4.1.7 Red-cockaded Woodpecker	4-6
4.1.8 Eastern Indigo Snake	4-20
4.1.9 Sea Turtles	4-21
4.1.10 Perforate Lichen	4-23
4.1.11 Freshwater Mussels	4-23
4.1.12 Avoidance and Minimization Measures	4-24
4.2 Other Species Considered	4-47
4.2.1 Gopher Tortoise	4-47
4.2.2 Florida Black Bear	4-48
4.2.3 Santa Rosa Beach Mouse	4-48
4.2.4 Florida Bog Frog	4-49
4.2.5 Dusky Gopher Frog	4-49
4.2.6 Pine Barrens Tree Frog	4-49
4.2.7 Florida Pine Snake	4-50
4.2.8 Shorebirds and Wading Birds	4-50
4.2.9 Bald Eagle	4-50
4.2.10 Southeastern American Kestrel	4-51
4.2.11 Avoidance and Minimization Measures	4-53
5. CONCLUSION	5-1
6. LIST OF PREPARERS	6-1
7. REFERENCES	7-1

LIST OF TABLES

	<u>Page</u>
Table 2-1. 75FG(A) - Cantonment/Support Facility Requirements	2-4
Table 2-2. Training Activities Associated With the 75FG(A)	2-6
Table 2-3. Required Weapons Training Ranges for the 75FG(A)	2-7
Table 2-4. Estimated 75FG(A) Ammunition Expenditure Per Range	2-10
Table 2-5. Estimated Annual Requirements for 75FG(A) Aircraft Operations	2-11
Table 2-6. Water Operation Locations	2-12
Table 2-7. Estimated 75FG(A) Equipment Requirements for Water Operations and Ground Maneuvering	2-15
Table 2-8. Proposed Facilities Associated With JSF IJTS	2-16
Table 2-9. Proposed Number of Sorties by Aircraft Variant for JSF Training	2-18
Table 2-10. Estimated Annual Sorties for Each Type of Airspace	2-19
Table 2-11. Annual Ordnance Requirements for JSF Training	2-20
Table 3-1. Sea Turtle Nesting Periods by Species	3-15
Table 3-2. Sea Turtle Nesting on SRI, Eglin AFB	3-16
Table 3-3. Eglin AFB SRI: Calculated Average Sea Turtle Hatching Occurrences by Month	3-18

January 2008

Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

ii

Appendix H

Biological Resources

LIST OF TABLES, CONT'D

	<u>Page</u>
Table 4-1. Training Activities Within the RCW Buffer Zone	4-7
Table 4-2. Red-cockaded Woodpecker Response to Vehicle Noise and Disturbance	4-9
Table 4-3. 7SFG(A) Range - Red-cockaded Woodpecker Response to Small Arms Noise	4-10
Table 4-4. Red-cockaded Woodpecker Response to Large Caliber Weapon Noise	4-11
Table 4-5. Representative A-Weighted SEL in Decibels under the Flight Track for the Aircraft at Various Altitudes in a Military Operating Area	4-13
Table 4-6. Foraging Habitat Variable Standards for Red-cockaded Woodpeckers	4-14
Table 4-7. 7SFG(A) Cantonment and Group 1 Ranges: Acres of RCW Foraging Habitat Cleared	4-15
Table 4-8. 7SFG(A) Road Improvements: Acres of RCW Foraging Habitat Cleared	4-18
Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities	4-24
Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities	4-53
Table 4-11. Cumulative Effects Determinations	4-62

LIST OF FIGURES

	<u>Page</u>
Figure 2-1. Location of Eglin AFB and Overland Air Space	2-2
Figure 2-2. Location of Proposed Action	2-3
Figure 2-3. Area of Road Improvements and Widening Along RR 213, RR 215, and RR 237 and Preliminary Location of Entry Control Point	2-5
Figure 2-4. View of Road Construction and Clearing on RR 215	2-6
Figure 3-1. Sensitive Species at 7SFG(A) Water Operations Areas and Interstitial Areas	3-2
Figure 3-2. Sensitive Species at JSF IJTS Location and MSA	3-4
Figure 3-3. Sensitive Species at Eglin Main (for JSF Flight Training)	3-5
Figure 3-4. Sensitive Species at Choctaw, B-82 and B-75 (for JSF Flight Training)	3-7
Figure 3-5. Sensitive Habitats and Species at Duke, C-62, and C-52E (for JSF Flight Training)	3-8
Figure 3-6. Sensitive Species at 7SFG(A) Cantonment and Group 1 SOF Range Locations	3-10
Figure 3-7. Sensitive Species at 7SFG(A) Cantonment MSA and MSA Expansion at Duke Field	3-11
Figure 3-8. Sensitive Species at 7SFG(A) Range Group 2 SOF and DZ/LZ Locations	3-12
Figure 3-9. Sensitive Species at East Bay Flatwoods and Santa Rosa Island	3-14
Figure 3-10. Eglin AFB SRI Average Sea Turtle Nest Occurrences by Month (1989-2007)	3-17

January 2008

Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

iii

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-103

Biological Resources

Appendix H

ACRONYMS, ABBREVIATIONS, AND SYMBOLS

%N2	Percent RPM at Engine Location #2
%NC	Percent Core RPM
33 FW	33rd Fighter Wing
46 TW	46th Test Wing
7SFG(A)	7th Special Forces Group (Airborne)
AAC	Air Armament Center
AF	Air Force
AFB	Air Force Base
AGE	Auxiliary Ground Equipment
AGL	Above Ground Level
AME	Alternate Mission Equipment
AMU	Aircraft Maintenance Unit
ATV	All-Terrain Vehicle
BA	Biological Assessment
BO	Biological Opinion
BRAC	Base Realignment and Closure
cal	Caliber
CC	Commander
COB	Cost of Business
CT	Continuation Training
CTIT	Centigrade Turbine Inlet Temperature
CTOL	Conventional Take-off and Landing
CV	Carrier-based Variant
dB	Decibels
dbh	Diameter at Breast Height
Demo	Demolish
Det	Detachment
DoN	Department of Navy
DZ	Drop Zone
ESA	Endangered Species Act
ETR	Engine Throttle Ratio
ENAI	Florida Natural Areas Inventory
FRIES	Fast Rope Insertion/Extraction System
ft²	Square Feet
FTD	Field Training Detachment
FWC	Florida Fish and Wildlife Conservation Commission
GBU	Guided Bomb Units
GIS	Geographic Information System
GPS	Global Positioning System
HLZ	Helicopter Landing Zone
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HQ	Headquarters
Hwy	Florida Highway
IJTS	Initial Joint Training Site
in	Inch
ITC	Integrated Training Center
JSF	Joint Strike Fighter
LAA	Likely to Adversely Affect
LFO load	Liftoff Loaded 140 Knots Indicated Air Speed
LMTV	Light Medium Tactical Vehicle

January 2008

Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

iv

H-104

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

ACRONYMS, ABBREVIATIONS, AND SYMBOLS, CONT'D

LOX	Liquid Oxygen
LZ	Landing Zone
m	Meter
MBBL	Thousand Barrels
MILCON	Military Construction
mm	Millimeter
MOA	Military Operating Area
MSA	Munitions Storage Area
MTR	Military Training Route
MXS	Maintenance Squadron
NE	No Effect
NLAA	Not Likely to Adversely Affect
NLAM	Not Likely to Adversely Modify
NRS	Natural Resources Section
Ops	Operations
OSS	Operational Support Squadron
PBG	Potential Breeding Group
POL	Petroleum, Oil, or Lubricant
QTR	Qualification Training Range
RAPIDS	Rapid Infiltration/Exfiltration
RCW	Red-cockaded Woodpecker
Ren	Renovate
RPM	Revolutions per Minute
RR	Range Road
SEL	Sound Exposure Level
SOF	Special Operations Forces
SPT	Support
Sqd	Squadron
SRI	Santa Rosa Island
STOVL	Short Take-off Vertical Landing
SUA	Special Use Airspace
T&E	Threatened and Endangered
TA	Test Area
TAMS	Tactical Aircraft Maintenance Specialist
TP	Target Practice
TS	Test Site
U.S.	United States
USEWS	U.S. Fish and Wildlife Service
UWO	Underwater Ordnance
WLT	Weapons Load Trainer

January 2008

Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

v

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-105

Biological Resources

Appendix H

This page is intentionally blank.

January 2008

Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

vi

H-106

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Introduction

1. INTRODUCTION

The following document is being submitted to fulfill requirements under Section 7 of the Endangered Species Act (ESA). This report addresses potential impacts to all federally listed threatened and endangered (T&E) species and candidate species associated with the Base Realignment and Closure (BRAC) actions at Eglin Air Force Base (AFB), Florida. This biological assessment (BA), conducted by Eglin's Natural Resources Section (NRS), is meant to initiate the formal consultation process with the United States (U.S.) Fish and Wildlife Service (USFWS) pursuant to Section 7 of the ESA. The objectives of this BA are to:

- Document all federally listed T&E species and associated habitat that occur, or may potentially occur, on Eglin AFB near the proposed action.
- Identify the activities that have the potential to impact, either beneficially or adversely, those documented species.
- Determine and quantify to the extent possible what effects these activities will most likely have on federally listed species.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

1-1

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-107

Biological Resources

Appendix H

Introduction

This page is intentionally blank.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

1-2

H-108

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

2. DESCRIPTION OF PROPOSED ACTION

The Proposed Action would result in a group of new missions at Eglin AFB (Figure 2-1) mandated by implementation of the BRAC Commission decisions. The BRAC implementation at Eglin AFB would require: constructing the 7th Special Forces Group (Airborne) (7SFG(A)) cantonment area; constructing the Joint Strike Fighter (JSF) Initial Joint Training Site (IJTS) cantonment area; and providing adequate access and capability to fulfill training missions of the two new users—the 7SFG(A) and the JSF Program (Figure 2-2). Sections 2.1 and 2.2 provide a summary of each action.

2.1 7SFG(A) PROPOSED ACTION

The purpose of the proposed action for the 7SFG(A) is to provide the facilities, ranges, equipment, and training/maneuver areas that match its wartime area of responsibility in Central and South America to maintain mission readiness for planning and executing unconventional warfare, combating terrorism operations, direct action, special reconnaissance, and foreign internal defense in support of the Global War on Terrorism. The 7SFG(A) would construct a Special Operations Forces (SOF) Compound, which would contain the cantonment area or main base for the 7SFG(A). Most weapons systems training for the 7SFG(A) would require the use of 13 ranges specifically designed for certain weapons training certifications. The majority of the land required for training would be utilized for mounted (in vehicles) and dismounted (on foot) maneuvers.

2.1.1 7SFG(A) Cantonment Area

The 7SFG(A) cantonment area would cover approximately 500 acres, and would be located between Lost Boy Pond to the west and Gopher Creek to the east (Figure 2-2). The site is undeveloped and consists of a mixture of pine plantations and good quality sandhills with an older canopy of longleaf pine. Cantonment requirements for the 7SFG(A) realignment would include establishing a SOF Compound composed of several functional building types, including administrative, industrial, warehouse, and residential (Table 2-1).

All 7SFG(A) munitions would fit inside the existing Munitions Storage Area (MSA) at Duke Field (Figure 2-2). Additional storage modules, igloos, and an explosives operating location would need to be constructed within the fenced area and to the west of the existing storage area. This area of approximately 3.5 acres would need to be cleared.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-1

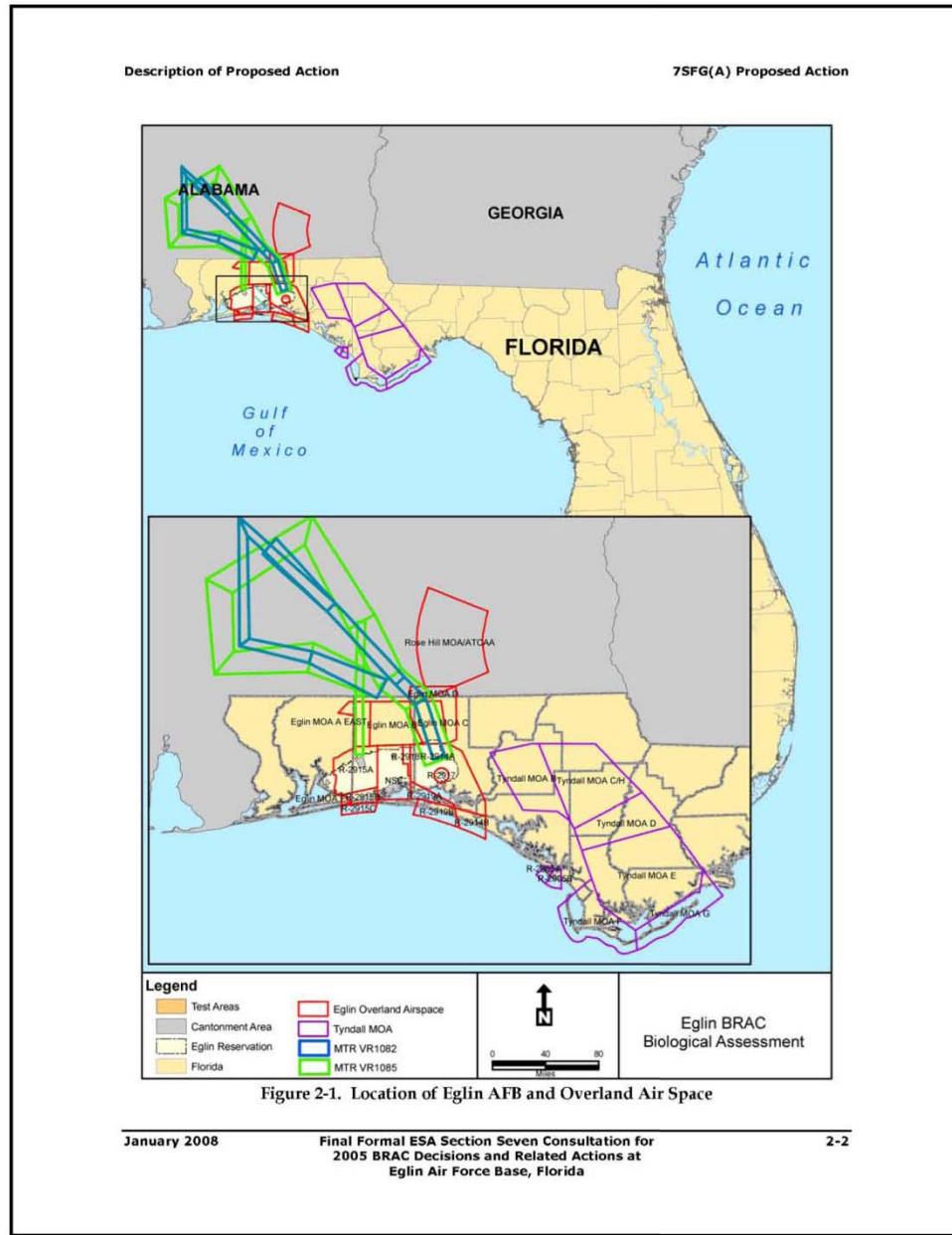
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-109

Biological Resources

Appendix H



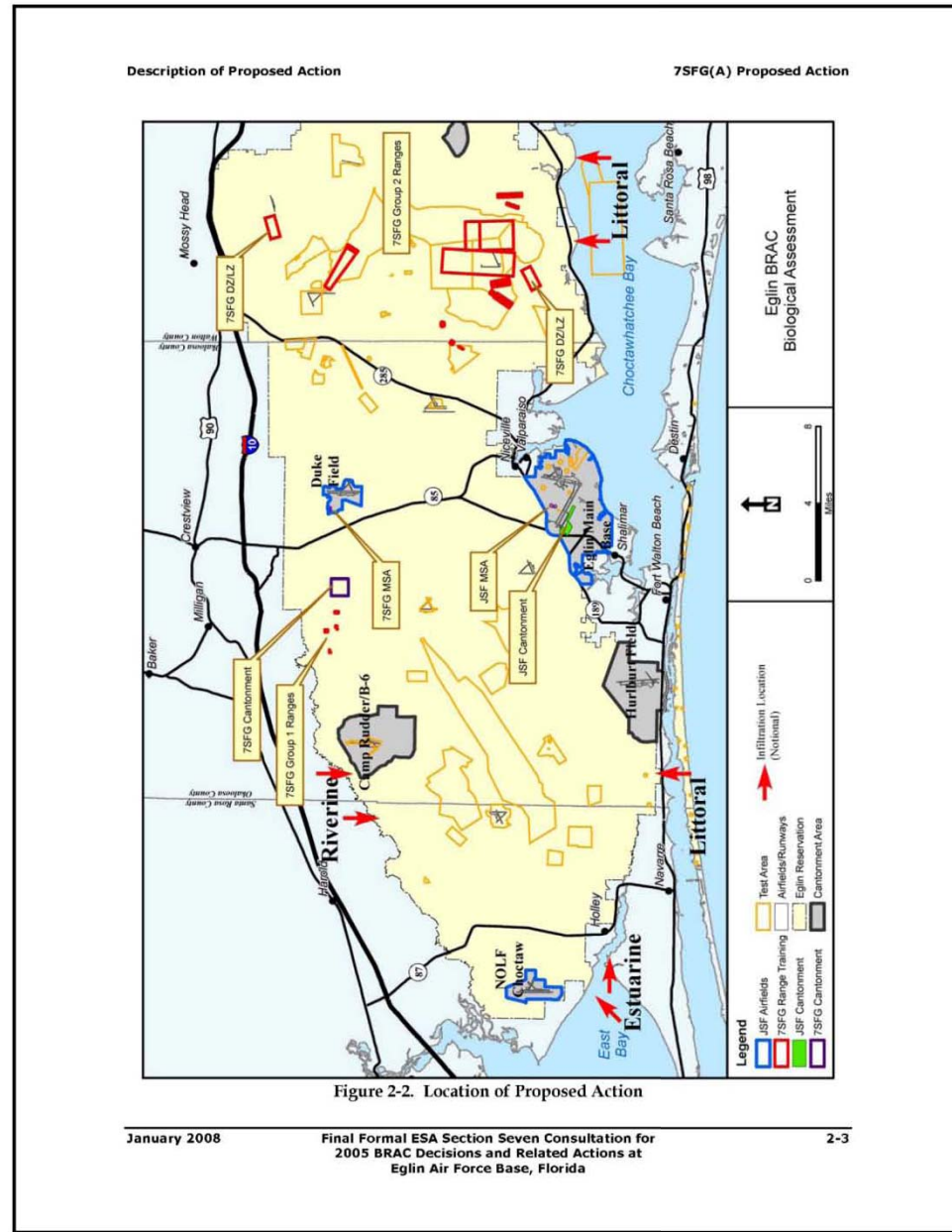
H-110

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources



October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-111

Biological Resources

Appendix H

Description of Proposed Action

7SFG(A) Proposed Action

Table 2-1. 7SFG(A) – Cantonment/Support Facility Requirements

Facility	Total Square Footage Required
Special Forces Group Operations Building	67,771
Special Forces Battalion Operations Complex	119,883
Special Forces Battalion Operations Complex	119,883
Special Forces Battalion Operations Complex	119,883
Special Forces Battalion Operations Complex (Expanded)	120,207
Support Battalion Complex	79,144
Vehicle Maintenance Complex	76,827
Privately Owned Vehicle Parking	699,993
Organizational Vehicle Parking	685,638
Logistics Complex	49,975
Petroleum, Oil, and Lubricant Storage	2,280
Enlisted Unaccompanied Housing	35,136
Enlisted Unaccompanied Housing	35,136
Enlisted Unaccompanied Housing	35,136
Dining Facility	13,245
Access Control Facility	3,400
Tactical Communications Center	3,762
Wash Platform	2,340
Ammunition Storage Magazine	10,230
Ammunition Surveillance/Inspection	5,895
Segregated Ammunition Storage	6,000
Indoor Baffle Range	23,000
Deployment Readiness Center	50,000
Physical Fitness Facility	44,347
Maritime Operations Facility	17,295
Hazardous Materials Storage	7,745
Deployment Equipment Storage	36,600
Tactical Communications Facility	3,762
Unmanned Aerial Vehicle Hangar	9,200
Weather Operations Facility	6,500
Sidewalks	285,768
Roads	1,771,191
Concrete Aprons	559,350
Total	5,106,522

Road Improvements

A number of road improvements, such as asphaltting or widening, are planned to provide proper access to the 7SFG(A) cantonment area and ranges. Road improvements and widening along Range Road (RR) 213, RR 215, RR 237, and RR 608 are proposed to connect the 7SFG(A) Group 1 ranges and cantonment area to Florida Highway (Hwy) 85 (Figure 2-3). Widening would include providing areas (right of ways) on each side of the road for water sewer, and electrical lines. The maximum width of the road would be 75 feet from the centerline (a swath of no more than 150 feet) (Figure 2-4). A preliminary location for the entry control point is designated in Figure 2-3. The area impacted would not be more than 400 feet in width overall and approximately 45 acres.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-4

H-112

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

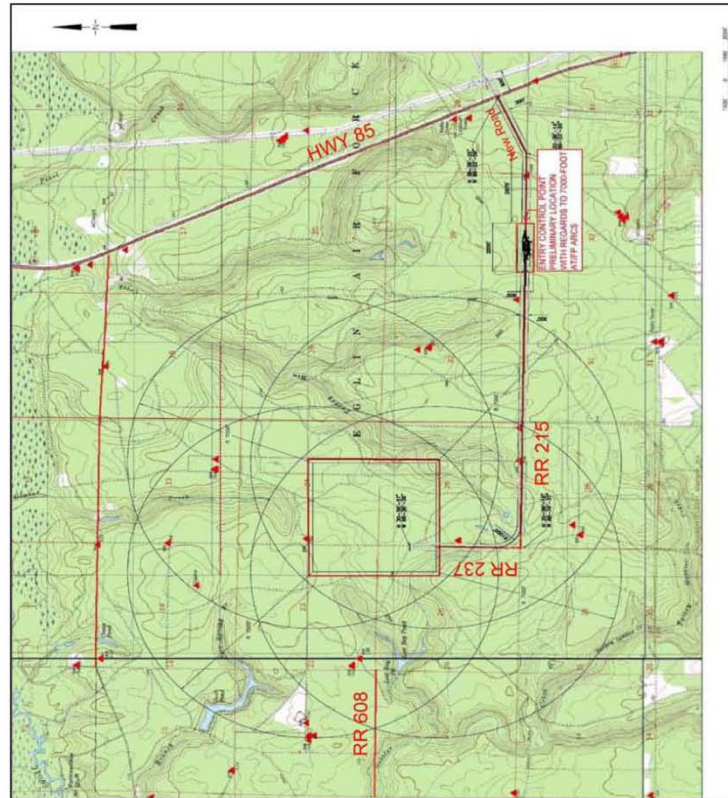


Figure 2-3. Area of Road Improvements and Widening Along RR 213, RR 215, and RR 237 and Preliminary Location of Entry Control Point

Source: U.S. Army Corps of Engineers, 2007

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-5

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-113

Biological Resources

Appendix H

Description of Proposed Action

7SFG(A) Proposed Action



Figure 2-4. View of Road Construction and Clearing on RR 215

2.1.2 7SFG(A) Range Training

The 7SFG(A) Range Training requires utilization of the Eglin Range in three areas: (1) Firing Ranges, (2) Aircraft Operations, and (3) Water Operations and Ground Maneuvers (Table 2-2).

Table 2-2. Training Activities Associated With the 7SFG(A)

Activity	Specific Training
Firing Operations – Firing Ranges	Individual Weapon
	Crew Served Weapon
	Team Training
	Indirect Fire System
	Explosives
Aircraft Operations – Fixed-Wing and Rotary	Infiltration/Exfiltration
	Insertion/Extraction Systems
	Container Delivery
	Close Air Support
	Airborne Operations
	Air Assault
Water Operations and Ground Maneuvers	Water Infiltration/Extraction
	Ground Infiltration/Extraction
	Ground Mobility
	Reconnaissance/Surveillance
	Medical Evacuation
	Stalking
	Convoy
	Visibility

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-6

H-114

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

Firing Ranges

The 7SFG(A) requires developed range land with facilities, utilities, roads, trails, and other assets. Table 2-3 summarizes the training facilities and assets that the 7SFG(A) would use as Firing Ranges for weapons training and certification.

Table 2-3. Required Weapons Training Ranges for the 7SFG(A)

Facility Description	Name	Size (acres)
<u>SOF Shoot House</u> The Shoot House would include a cluster of buildings around a courtyard, a 100-meter flat range, and an elevated sniper position and observer platform approximately 200 to 300 meters to the rear of the Shoot House.	SOF 1	0.72
<u>SOF Sniper Range Suite</u> The SOF Sniper Range Suite is an SOF-specific range where shooters engage targets up to the maximum range of the .50-caliber Sniper Rifle. It includes a Known Distance Range, field fire, a four-story urban hide and rooftop firing platform, a 10-foot perimeter fence, a general instruction building, a 500-by-1,000-meter Helicopter Landing Zone, access control buildings, and training and support buildings.	SOF 2	182.88
<u>SOF Breach Facility</u> The Breach Facility consists of a retaining wall and door-, window-, and wall-breaching structures. No automation is required for this facility. A latrine would be required if the facility is not co-located with another Range Operations Control Area. The facility trains soldiers on the technical aspects of breaching techniques, as well as Techniques, Tactics, and Procedures and explosive techniques not trained on at any other type of facility.	SOF 3	4.00
<u>SOF Shotgun Range</u> The Shotgun Range would be an open range with no buildings. The range would consist of a Trap Target Area, 25-meter flat range, and a 10-meter Dispersion Range. An obstacle course is planned in addition to the range.	SOF 4	13.96
<u>MK19/M203 Grenade Launcher Range</u> The Grenade Launcher Range would include four firing stations. No automation would be required at this facility. All targets would be fixed at required distances. There would be no defined standalone MK19 range. Therefore, an evaluation of the MK19 component of the Multipurpose Machine Gun Range (which comprises 10 firing positions) has been included in the development of a combined range for MK19/M203 training. MK19 targets range from 400 to 1,500 meters.	SOF 5	180.88
<u>Mortar Weapons System Range</u> The Mortar Range would be a standard Army range. It requires surveyed firing points, a common dedicated impact area for all types of mortars, and should be at least 2,000 meters wide and 6,000 meters deep. The actual range would include range operations control, ammunition breakdown, and latrine areas. Due to the nature of the range activities, extensive clearing and grubbing may be required.	SOF 6	2,965.25

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-7

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-115

Biological Resources

Appendix H

Description of Proposed Action

7SFG(A) Proposed Action

Table 2-3. Required Weapons Training Ranges for the 7SFG(A), Cont'd

Facility Description	Name	Size (acres)
Hand Grenade Qualification Course Targets include bunkers, mortars, and trenches. Construction would include operations, logistics, and support areas. The qualification course allows soldiers to use fused practice hand grenades to engage targets in natural terrain under simulated combat conditions. This range description does not include throwing live hand grenades.	SOF 7	10.01
Urban Assault Course This facility is used to train individual soldiers, squads, and platoons on tasks necessary to operate within a built-up or urban area. The Urban Assault Course would include a range with five stations consisting of multiple infantry target patterns in an urban setting. It would also have operations and storage buildings plus support facilities.	SOF 8	17.60
SOF Battle Area Complex The proposed SOF Battle Area Complex would provide opportunities to evaluate mounted and dismounted maneuvers and engagements. It would include the creation of villages, a road network, and a control center. The control center would house ammunition breakout, administration, range operations, and an area for After Action Reviews.	SOF 9	2,372.20
Anti-Armor Tracking and Live Fire The Anti-Armor Tracking and Live Fire range includes multiple targets that are stationary or mounted on rails. This standard Army range allows individuals and crews to identify, track, engage, and defeat stationary and mobile targets. Live ammunition would not be expended on this range. Accommodations for live fire would be made adjacent to this portion of the range.	SOF 10	741.31
Qualification Training Range* The Qualification Training Range (QTR) is a complex of standard Army ranges (Multipurpose Machine Gun, Modified Record Fire, Combat Pistol, and Sniper Field Fire Ranges) where shooters engage stationary and moving infantry and armor targets. The QTR includes multiple firing positions, lane markers, a security barrier, range operations and control areas, and an ammunition breakdown area. It also consists of a range operations center, range tower, storage building, general instruction building, latrine, covered mess, and an enclosed bleacher.	SOF 11	218.18
SOF Light Demolition Range The Army Standard Light Demolition Range would include six demolition points, an access road, and latrines.	SOF 12	26.93
SOF 25 Meter Zero Range The 25 Meter Zero Range is a standard Army range where shooters engage targets at 10 and 25 meters. The range is used to confirm a weapon's accuracy prior to its use on a qualification range. The actual range has no automation. It includes multiple firing positions, lane makers, and range operations and control areas. This range would also contain a range operations center, storage building, general instruction building, latrine, security barrier, covered mess, an enclosed bleacher, and an ammunition breakdown area.	SOF 13	2.72
Total		6,736.64

SOF = Special Operations Forces; QTR = Qualification Training Range

* The QTR has four components:

Notes are continued on the next page...

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-8

H-116

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

Multipurpose Machine Gun Range: The Multipurpose Machine Gun Range would be an automated range. The range would include multiple lanes, a range operations facility with tower, bleachers, latrine, storage, and an ammunition breakdown area.

Modified Record Fire Range: This range is used to train and familiarize soldiers on the skills necessary to identify, engage, and hit stationary infantry targets with the M16 and M4 rifles. The range would include stationary infantry targets and foxhole positions. All targets would be fully automated and computer-driven and scored from the range operations center.

Combat Pistol Qualification Range: The Combat Pistol Qualification Range is a standard Army range where shooters engage infantry targets at close range. It includes multiple firing positions, lane makers, and range operations and control areas. It also consists of a security barrier, range operations center with tower, storage building, general instruction building, latrine, covered mess, an enclosed bleacher, and an ammunition breakdown area.

Sniper Field Fire Range: This range is used to train soldiers on the skills necessary to detect, identify, engage, and defeat stationary and moving infantry targets in a tactical array. This range is designed to satisfy training and qualification requirements of the M24 sniper rifle. It would include stationary and moving infantry targets along with four firing positions. All targets would be fully automated and computer-driven and scored from the range operations center. Natural vegetation would be required in the target area to provide realistic natural obstacles for the sniper to negotiate.

The ranges were divided into two separate groups, Group 1 and Group 2:

- Group 1 (four ranges)
 - Shoothouse (SOF 1)/Zero Range (SOF 1a)
 - Breach Facility (SOF 3)
 - Shotgun Range (SOF 4)/Zero Range (SOF 4a)
 - Hand Grenade Familiarization/Assault Course (SOF 7)
- Group 2 (nine ranges)
 - Sniper Suite (SOF 2)
 - MK19/M203 range (SOF 5)
 - 81 millimeter (mm) mortar range (SOF 6)
 - Urban Assault Course (SOF 8)
 - Battle Area Complex (SOF 9)
 - Anti-Armor and Tracking Range (SOF 10)
 - Qualification Training Range (SOF 11)
 - Demolition Range (SOF 12)
 - 25 Meter Zero Range (SOF 13)

Group 1 Ranges would be located on the western side of the range, to the east of Camp Rudder, and the Group 2 Ranges would be sited on or near Test Areas (TAs) C-52, C-53, and C-72, on the eastern side of the Eglin Reservation (Figure 2-2). Group 1 ranges would be dedicated for use by only 7SFG(A) personnel, and would likely be in use on all available training days. The ranges in Group 2 would be heavily utilized by 7SFG(A) personnel, but would also be used by other range user groups. Table 2-4 presents the estimated ammunition expenditures at each range.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-9

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-117

Biological Resources

Appendix H

Description of Proposed Action

7SFG(A) Proposed Action

Table 2-4. Estimated 7SFG(A) Ammunition Expenditure Per Range

TYPE	CURRENT TOTAL QUANTITY	EXTRAPOLATED QUANTITY	# Weapons Shooling Variants of Ammunition Type	SOF 1 - Shoot House/100m Flat Range	SOF 2 - Sniper Range Suite	SOF 3 - Breach Facility	SOF 4 - Shotgun Range/25 m Flat Range	SOF 5 - MK19/M203 Grenade Launcher	SOF 6 - Mortar Weapons Systems Range	SOF 7 - Hand Grenade Qualification Course	SOF 8 - Urban Assault Course	SOF 9 - Battle Area Complex Tracking and Live Fire	SOF 10 - Anti-Armor Training Range	SOF 11 - Qualification Range	SOF 12 - Light Demolition Range	SOF 13 - 25 Meter Zero Range
.45 CALIBER	26,000	29,000	4	9,000										20,000		966,000
5.56 MM	4,242,000	4,965,000	2,106	1,000,000							1,000,000	1,000,000		1,000,000		298,000
7.62 MM	915,000	1,248,000	524	100,000	200,000						100,000	300,000		250,000		1,000,000
9 MM	1,944,000	2,100,000	1,293	100,000			100,000							900,000		
12 GAGE	33,000	34,000	153				15,000					4,000				
.50 CALIBER	250,000	300,000	156	2,000	130,000							90,000		30,000		
40 MM	50,000	57,000	229					30,000				27,000				
60 MM	7,000	8,200	35						8,200							
81 MM	5,100	6,300	4						6,300							
84 MM	380	400	20										400			
106 MM	0	0	0													
MINES	2,200	2,500														
DEMOLITION																2,500
Misc. Explosive Devices																
Total Demol/Devices	NA	NA														
HAND GRENADES	7,600	8,100														
FLARES	2,100	2,400														7,000
SIMULATORS	9,500	11,400														
ROCKETS	850	1,260														

MINES, DEMOLITIONS, GRENADES, ROCKETS

Total includes variations of TNT, Shape Charges, Dynamite, and 769,306 feet of Detonation Cord. Total DCS NOT include various igniters (Miscellaneous Explosive Devices).

To be expended across Demolitions Range (SOF 12), and Breach Facility (SOF 3)

Assumption: These include hand-held type to include sar clusters, etc., and would be dispersed among maneuver areas similar to the Ranger's utilization with the exception of the mortars illumination rounds. If this is the case, a breakdown of hand-held places versus illum for mortars is needed.

Assumption: These are artillery simulations, hand grenade simulations, etc., and would be dispersed among maneuver areas similar to the Ranger's utilization.

Sources: U.S. Army, 2005; Dill, 2006a
m = Meter; mm = Millimeter; SOF = Special Operations Forces

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-10

H-118

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

Aircraft Operations

The 7SFG(A) range training at Eglin would require the use of airspace for fixed-wing and rotary-wing operations. 7SFG(A) would use existing Landing Zones (LZs) and Drop Zones (DZs), plus two new proposed DZs (Figure 2-2). 7SFG(A) air operations would occur over the Firing Ranges listed previously as well as over the water operations and ground maneuver areas. Table 2-5 describes the types of air operations and annual estimated number of missions and hours. Also listed are the capabilities required for the type of air operation listed.

Table 2-5. Estimated Annual Requirements for 7SFG(A) Aircraft Operations

Type of Air Operation		# of Missions	# of Hours	Capabilities Required
<i>Rotary-Wing</i>	Airborne Operations	68	272	DZ
	Helocast*	9	96	Water DZ
	FRIES	111	666	HLZ
	Sling Load	20	340	HLZ
	Air Assault	79	948	HLZ
	TOTAL	287	2,322	
<i>Fixed-Wing</i>	Static Line Airborne Operations	137	628	DZ
	Military Free Fall Airborne Operations	53	220	DZ
	RAPIDS	21	168	Landing Strip for C-130
	Container Delivery System Operations	17	68	
	Close Air Support	36	144	Targets
	TOTAL	286	1,228	
Air Operations Totals		573	3,550	

Source: U.S. Army, 2005; Dill, 2006b

DZ = Drop Zone; FRIES = Fast Rope Insertion/Extraction System; HLZ = Helicopter Landing Zone; RAPIDS = Rapid Infiltration/Exfiltration

* Helocast operations involve soldiers jumping from low flying helicopters into the water, usually no more than 40-foot high jumps at 40 knots speed

Water Operations and Ground Maneuvering

The water operations and ground maneuver requirements for the 7SFG(A) provide training for a wide variety of activities such as reconnaissance, surveillance, visibility training, convoy training, and so on. The water operations and ground maneuver requirements do not include any live fire activity, as all ammunition would be confined to the Firing Ranges. The 7SFG(A) would perform ground maneuver activities on any land areas within the Eglin Reservation. A maximum of 125 square kilometers

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-11

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-119

Biological Resources

Appendix H

Description of Proposed Action

7SFG(A) Proposed Action

(48.26 square miles) of area (not defined in any particular shape) would be required for one ground training mission. The infiltration/exfiltration training activities may involve any combination of ground operations, water operations, and air operations. The following summarizes the types of activities that would be included in the 7SFG(A) range training that does not involve the use of live fire.

Water Operations

The 7SFG(A) would require the use of rivers, Choctawhatchee Bay, and nearshore coastal areas for water infiltration/exfiltration training (Figure 2-2). Water infiltration techniques would be initiated from surface or sub-surface mother craft, dropped by parachute from fixed-wing aircraft, or delivered by rotary-wing aircraft (Table 2-6). The 12-man teams will infiltrate or exfiltrate using scuba equipment, combat rubber raiding craft (or Zodiac boats), or surface swim techniques.

Table 2-6. Water Operation Locations

Action	Choctawhatchee Bay	Santa Rosa Sound	Yellow River	Santa Rosa Island	East Bay	East Bay River
Water-to-Land Transition: Boat Operations	•	•	•	•	•	•
Air-to-Water Transition: Paratroop/Paradrop	•	•	•	•	•	

Foot Movement

Ground training includes a number of activities, but is generally the movement of dismounted soldiers through wooded areas of the interstitial area. To increase the realism of the training events, some blank small-arms ammunition, hand flares, smoke grenades, or other training ammunition are expended during certain operations. In almost all cases, ground training on foot involves movement under covert, clandestine conditions without leaving any evidence of troop presence. Troop movement also generally occurs in single file movement of a small group, so that large troop movements over a large land mass do not occur. Land navigation training may occur during daytime or nighttime. Troop movement on foot may also be used for training in search and rescue, personnel recovery, and reconnaissance. Personnel movement may occur on established roads, along or across streams, through cleared areas, wooded areas, and on rare occasions through swamp environments. These types of activities would occur with teams of no more than 12 troops, and movements over the same area would occur with limited frequency.

Typical troop movement activity includes:

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-12

H-120

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

- Road March (done on existing roads for extended lengths of travel).
- 6- to 12-man team insertion/extractions from varying methods (parachute, boat infiltration, and helicopter). Insertions are clandestine activities. Regardless of how an insertion is accomplished, personnel would most often walk away.
- Clandestine movement by foot to training objective sites (most often culminating at firing ranges).
- Foot movement to Firing Ranges through the interstitial area and on existing roads.
- Vehicle movement to Firing Ranges utilizing existing roads.

Aircraft, Boats, and Vehicles

Aircraft, boats, and ground support vehicles are occasionally integrated into the training to deliver and retrieve the participating troops or provide support and logistics. Ground vehicle movement is normally restricted to the existing road and trail network, but some training integrates the use of all-terrain vehicles (ATVs) or small trucks. Airborne operations include the use of rotary or fixed-wing aircraft for the insertion, extraction, movement, or supplying of ground troops. This could include the delivery of paratroops or paradrops. Paratroops are personnel who jump from an aircraft and descend by parachute from varying altitudes. Paradrops are the delivery of equipment or supplies using parachutes. These equipment or supplies are palletized and rigged with multiple automatically deploying parachutes.

The 7SFG(A) would require the use of helicopter landing zones (HLZs) and parachute DZs. The Eglin Range contains landing zones, HLZs, and parachute DZs within the interstitial area (the areas between test areas). These zones are established for user groups that conduct training and testing that integrate ground and air operations. Landing zones are used for touchdown and takeoff of fixed-wing and rotary military aircraft. HLZs are established for the landing and takeoff of military helicopters. HLZs may be improved surfaces such as concrete or asphalt; however, the majority of HLZs on the Eglin Reservation are cleared, grassy areas either on a test range or in the interstitial area. DZs are areas for inserting paratroops or parachuting equipment or palletized supplies. The 7SFG(A) would use existing HLZs and DZs. However, two new DZ locations have been proposed (Figure 2-2). The proposed DZs would be rectangles of approximately 1,500 meters by 700 meters. The northern proposed DZ typically has pines and scrub oaks and is currently uncleared. The southern proposed DZ has been previously clear-cut and consists of planted pines of various heights. Both areas would need to be cleared for parachute operations.

Vehicle use would be primarily on existing roads, though some off-road use may occur. Overall, there would be minimal vehicle use associated with interstitial missions. The largest vehicle that may traverse off road is a High Mobility Multipurpose Wheeled

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-13

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-121

Biological Resources

Appendix H

Description of Proposed Action

7SFG(A) Proposed Action

Vehicle (HMMWV) (1/4-ton truck). The vehicles would not traverse in wetlands or swamps. Tasks that may require leaving existing roads include setting up remote communication relay sites. Often, this requires one to two vehicles traveling to a known point for limited mission-specific activity. Other tasks include "Zone Recce" where a series of vehicles may temporarily conceal themselves off the existing travel routes for a short period. Small ATVs would also be utilized and in most cases would support establishment of DZs, HLZs, and occasional insertion to a remote area for other on-foot activities.

The 7SFG(A) would utilize Combat Rubber Raiding Craft (Zodiac Boats). These Zodiac Boats would be utilized for water DZ support. This activity merely requires the boat to remain in a mobile position in order to retrieve paratroopers from the water. The watercraft would also be utilized for insertion into an area of operation. Personnel would come ashore on a river bank, bay shore, or beach shore and would clandestinely depart the area, leaving no trace of their presence. Boats may be abandoned at an insertion point and retrieved by varying means to include being towed back out to the water for pickup or hauled away by support personnel. Support personnel would hand-carry boats to a vehicle-hauled trailer for movement out of the area via existing roads.

Bivouac

Troops use a number of different bivouac scenarios that vary from tents on concrete pads to primitive camping. Training would normally include small teams, usually 12 men or less, that rarely halt movement for sufficient duration to establish a bivouac. The majority of the 7SFG(A) activities fall in this category. 7SFG(A) soldiers would not dig fighting positions under this category. On occasion, units may establish primitive/temporary bivouac facilities (patrol bases) and would not stay in the same location for more than 48 hours. It is a tactical standard for units to ensure that sites used for primitive bivouac are left with no evidence of their use. A few times per year, larger units with equipment and vehicles establish longer-term bivouac facilities in the open areas around auxiliary fields. Units using these sites make an effort to reduce the impacts on the environment; however, because of the equipment, this standard is not as easily attained. Limited digging may be involved. 7SFG(A) support companies do not set up field kitchens to provide warm rations. Any waste and other trash are bagged and transported to dumpsters for disposal or carried out in the individual soldier's pack.

Table 2-7 describes the equipment that the 7SFG(A) would utilize for water operations and ground maneuvering.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-14

H-122

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

7SFG(A) Proposed Action

Table 2-7. Estimated 7SFG(A) Equipment Requirements for Water Operations and Ground Maneuvering

Equipment Type	Operation	Missions/Year	Hours/Year
Ground Vehicles – Wheeled			
HMMWV (1-1/4 Ton)	Mobility Training*	288	576
	Live Fire Platform	144	432
	Zone Recce	144	432
HMMWV (Heavy)	Convoy Training	40	80
	SPT Live Fire	20	60
HMMWV (Expanded)	Commo Exercises	20	60
	Range Support	3,663	29,323**
	DZ Support	816	3,264**
2-1/2 Ton Cargo Truck LMTV	DZ Support	816	3,264**
	Boat Transport	140	280
	Convoy Training	40	120
5 Ton Cargo LMTV	Live Fire Platform	20	60
	Exercise Support	20	80
	Ammo Transport	200	200
ATV/Motorcycle	Live Fire Platform	20	60
	Mobility Training	288	576
Watercraft			
Combat Rubber Raiding Craft (Zodiac Boats)	UWO Training (12 Scuba Teams)	120	480
	Water DZ Support	20	60

ATV = All Terrain Vehicle; DZ = Drop Zone; HMMWV = High Mobility Multipurpose Wheeled Vehicle; LMTV = Light Medium Tactical Vehicle; SPT = Support; UWO = Underwater Ordnance

*Mobility training based on 72 12-man teams sharing the vehicles in the unit and conducting four events per 12-man team at two hours per event.

**Range/DZ Support Hours includes sitting at the range after ammo and supply transport, and not always moving.

2.2 JSF PROGRAM PROPOSED ACTION

The purpose of the proposed action for the JSF Program is to provide the facilities, classrooms, instruction, equipment, ranges, and airspace needed to teach aviators and maintenance technicians how to properly operate and maintain the new JSF weapon system. The aircraft accompanying the JSF IJTS and beddown is the F-35. The F-35 is a supersonic, single-seat, single-engine aircraft capable of performing and surviving lethal strike warfare missions.

2.2.1 JSF IJTS

The JSF Program anticipates that the IJTS would require between 100 and 200 acres (Figure 2-2), and would provide the facilities to house academic classrooms, virtual trainers, flying training squadrons, and hardware trainers. Additionally, the JSF IJTS has a requirement for munitions storage and live ordnance loading areas. The JSF IJTS would use the existing MSA for the 46th Test Wing (46 TW) (Figure 2-2). The explosives storage would be within the confines of the existing MSA fence. The proposed operating facilities would be located outside the fence and along the western

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-15

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-123

Biological Resources

Appendix H

Description of Proposed Action

JSF Program Proposed Action

edge of the MSA. The removal of administration/supervisory buildings 1278, 1284, 1289, and Gazebo J would be required to achieve storage capability. The supervisory facilities would be combined into a new supervision building of approximately 7,000 square feet (ft²) on Perimeter Road, where the gate to the 46 TW area is located.

The JSF IJTS would be one contiguous campus environment to accommodate the entire proposed JSF IJTS facility requirements, which would consist of constructing a combination of new buildings as well as renovating existing facilities/buildings located in the 33rd Fighter Wing (33 FW) area (Figure 2-2). Initial requirements involve constructing approximately 23 new facilities or buildings, taxiways, and runways (Table 2-8).

Table 2-8. Proposed Facilities Associated With JSF IJTS

MILCON Project	Disposition			Square Footage
	Demo	Ren	New	
Sqd Ops/AMU (AF-1)			X	77,644
Integrated Training Center (ITC)			X	200,000
Munitions Maintenance			X	40,479
Dorm (100 Room)			X	40,479
Dorm (100 Room)			X	40,479
Dining Facility			X	14,010
POL Hydrant Pits			X	8 Each
POL West Side Tank Headers			X	4 Each
POL West Side Ops Facility			X	5,000
POL Fillstands Flightline			X	2 Each
POL Bulk Storage Tanks			X	100 MBBL
Sqd Ops/AMU (Marines)			X	49,830
Sqd Ops/AMU (Navy)			X	49,830
Sqd Ops/AMU (AF-2)			X	74,147
Sqd Ops/AMU (AF-3)			X	74,147
Rinse Facility "Bird Bath" N			X	3,000
Rinse Facility "Bird Bath" S			X	3,000
New Apron			X	864,000
Taxiway Extension			X	879,300
Live Ordnance Loading Area			X	850,500
TAMS			X	22,500
Chaff and Flare			X	2,000
AME Maintenance			X	5,000
Wash Rack			X	11,000
Wing/Group HQs			X	20,000
Satellite Medical Facility			X	
Utilities			X	1 LS
Roads			X	506,000
STOVL Pad (Eglin)			X	30,000
STOVL Tower (Eglin)			X	1 Each
STOVL Pad (Duke)			X	30,000
STOVL Tower (Duke)			X	1 Each
West Apron		X		1,410,658

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-16

H-124

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of Proposed Action

JSF Program Proposed Action

Table 2-8. Proposed Facilities Associated With JSF IJTS, Cont'd

MILCON Project	Disposition			Square Footage
	Demo	Ren	New	
Renovate 1318 (Phase 1)		X		22,963
Renovate 1404 – Storage		X		48,001
Renovate 1309 – Sim Bay		X		17,595
Renovate 1318 (Phase 2)		X		34,445
Renovate 1344 – WLT		X		27,321
Renovate 1326 – Groups HQ		X		19,764
Renovate 1312 – AF/DoN Ops		X		17,740
Renovate 1321 – OSS		X		34,868
Renovate 1315 – Wing HQ		X		21,317
Renovate 1343 – AME		X		36,998
Comm Support Flight		X		8,870
Munitions Maintenance Facility(ies)		X		5,219
Munitions Maintenance Facility(ies)		X		4,624
Munitions Maintenance Facility(ies)		X		7,360
Renovate 1363 – FTD		X		23,462
Tech Training Det/Sqd CC Staff		X		8,870
Add/Alter Calibration Lab		X		14,654
MXS 1328		X		27,609
Pavement Improvements		X		500,000
Roads		X		506,000
Duke Tower		X		1,041
Demo Jet Engine Shop	X			7,400
Demo Fuel Shop	X			18,807
Demo Storage Facility	X			100
Demo 58th AMU Hangar	X			33,998
Demo 60th AMU Hangar	X			36,968
Demo Pump Station	X			1 Each
Demo Chaplain	X			439
Demo LOX Storage	X			3,395
Demo Engine Shop	X			62,481
Demo AGE	X			15,783
Demo Weapon Release Shop	X			9,680
Demo Aircraft Shop	X			1,440
Demo LOX Plant	X			672
Demo Jet Engine Shop	X			3,200
Demo Pavilion	X			1 Each
Petroleum Ops	X			567
Weapon Systems Management	X			630
Munitions Control	X			800
Munitions Accountability/Ops	X			800
Building 1278	X			1,789
Gazebo “J”	X			(negligible)

Source: Roxstrom, 2006; AF/DoN = Air Force/Department of the Navy; AGE = Auxiliary Ground Equipment; AME = Alternate Mission Equipment; AMU = Aircraft Maintenance Unit; CC = Commander; Demo = Demolish; Det = Detachment; FTD = Field Training Detachment; HQ = Headquarters; LOX = Liquid Oxygen; MBBL = Thousand Barrels; MILCON = Military Construction; MXS = Maintenance Squadron; Ops = Operations; OSS = Operational Support Squadron; POL = Petroleum, Oil, or Lubricant; Ren = Renovate; Sqd = Squadron; STOVL = Short Take-Off and Vertical Landing; TAMS = Tactical Aircraft Maintenance Specialist; WLT = Weapons Load Trainer

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-17

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-125

Appendix H

Biological Resources

Description of Proposed Action

JSF Program Proposed Action

landing, an overhead break, touch-and-go landings, conventional landings, closed patterns, or simulating a flameout. Typically, most of the activity at the main airfield would be launches and recoveries of aircraft.

To perform flight training identified in the syllabus, the JSF would utilize a variety of Special Use Airspace (SUA) on a routine basis. The over-land airspace is shown in Figure 2-1 and consists of Military Operating Areas (MOAs), restricted airspace ("R-number"), and Military Training Routes (MTRs). The distribution of the proposed sorties in SUA would be dictated by the utilization, scheduling priorities, and training requirements of the aircraft. Table 2-10 shows the current or baseline (2005) number of sorties and the proposed distribution of sorties at the end state (2018) in each type of SUA.

Table 2-10. Estimated Annual Sorties for Each Type of Airspace

Airspace Element	Baseline (2005)		End State (2018)		Percent Change
	F-15 from 33 FW	Other Aircraft	F-35	Other Aircraft	
Restricted Airspace					
R-2914A	1,552	6,772	3,278	6,772	21
R-2914B	11	302	3,278	302	1,044
R-2915A	770	24,439	3,278	24,439	10
R-2915B	66	1,929	3,278	1,929	161
R-2915C	66	1,135	3,278	1,135	267
R-2918	0	640	0	640	0
R-2919A	66	704	3,278	704	417
R-2919B	66	428	3,278	428	650
Military Operating Areas (MOAs)					
Eglin MOA - A	0	629	3,278	629	521
Eglin MOA - B	0	276	0	276	0
Eglin MOA - C	0	264	3,278	264	1,242
Eglin MOA - D	0	210	0	210	0
Eglin MOA - E	0	61	0	61	0
Eglin MOA - F	0	686	0	686	0
Tyndall MOA C/D/E/F	30	4,094	546	4,094	13
Military Training Routes (MTRs)					
VR-1082	0	173	295	173	171
VR-1085	0	73	295	73	404

In Table 2-10, the column labeled "F-15 from the 33 FW" indicates the number of sorties in the baseline year (2005). The column labeled "Other" indicates all other aircraft using the airspace and the total sorties. As the 33 FW will be transitioning to the F-35, there would be no F-15 sorties during 2018, which is the end state. The last column in

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-19

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-127

Biological Resources

Appendix H

Description of Proposed Action

JSF Program Proposed Action

Table 2-10 shows the percent change in the number of sorties in each airspace unit. The changes are all due to the conversion from the F-15 to the F-35 aircraft.

Warning Area W-151 would be the primary airspace utilized by the JSF flight training. Any weapons fired into the Gulf of Mexico will be inert. All activities over the Gulf of Mexico are covered under the Eglin Gulf Test and Training Range Programmatic Environmental Assessment and Biological Assessment. The Tyndall MOAs, VR-1082, and VR-1085 would be used in the JSF flight training for low-level operations. The JSF flight training would use restricted areas (R-2914/15/18/19) for air-to-surface munitions drops and strafing runs. In addition, the JSF flight training would use this area to simulate attacks on threat emitters and to practice evasive maneuvers.

Ordnance, such as guided bomb units (GBU) (laser and global positioning system [GPS]-guided) is proposed to be used as part of JSF flight training. The JSF Program estimates that both the student and instructor pilot would carry and/or release approximately 600 ordnance units per year. Some of the required JSF training includes the use of 25-mm ammunition during strafing runs. Most of these strafing events would be associated with Basic Air-to-Ground and Close Air Support training events. Ordnance use would include both live and inert bombs (Table 2-10).

Table 2-11. Annual Ordnance Requirements
for JSF Training

Type of Ordnance	Annual Quantity
GBU-12 (live)	635
GBU-12 (inert)	219
25-mm (TP)	208,518
Flares (MJU-8/27)	1,363

GBU = Guided Bomb Units; TP = Target Practice

JSF students would also expend flares during a portion of their flights (Table 2-10). The flares proposed for use include the MJU-8/27. Current procedures for flare use are found in Air Armament Center (AAC) Instruction 11-201, *Air Operations*, and would be used during JSF flight training. Flares may be used over the Eglin Reservation with a minimum altitude release over the test areas of 200 feet above ground level (AGL) and 500 feet AGL over other areas.

To provide flexibility and diversity to the students, the Air Force proposes that the live and inert ordnance be used on existing targets on the eastern and western sides of the Eglin Range. For strafing, the JSF flight training would use TA C-62 on the east and TA B-75 on the west (Figure 2-2). For both inert and live bombs, TAs C-52E on the east and B-82 on the western side would be used (Figure 2-2).

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

2-20

H-128

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Federally Listed Species

3. BIOLOGICAL INFORMATION

Ten federally listed T&E species, four candidate species, and critical habitat for two T&E species occur near or within the project area (Section 3.1). Multiple state-listed species also are located in the project area (Section 3.2). The following list indicates those federally listed species considered for this action:

<u>Common Name</u>	<u>Scientific Name</u>	<u>Federal Status</u>
Gulf Sturgeon	<i>Acipenser oxyrinchus desotoi</i>	Threatened
Okaloosa Darter	<i>Etheostoma okaloosae</i>	Endangered
Flatwoods Salamander	<i>Ambystoma cingulatum</i>	Threatened
Piping Plover	<i>Charadrius melodus</i>	Threatened
Red-cockaded Woodpecker	<i>Picoides borealis</i>	Endangered
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	Threatened
Atlantic Green Sea Turtle	<i>Chelonia mydas</i>	Endangered
Atlantic Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered
Perforate Lichen	<i>Cladonia perforata</i>	Endangered
Choctaw Bean	<i>Villosa choctawensis</i>	Candidate (Endangered)
Fuzzy Pigtoe	<i>Pleurobema strodeanum</i>	Candidate (Endangered)
Southern Sandshell	<i>Lampsilis australis</i>	Candidate (Endangered)
Southern Kidneyshell	<i>Ptychobranchus jonesi</i>	Candidate (Endangered)

3.1 FEDERALLY LISTED SPECIES**3.1.1 Gulf Sturgeon**

The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is a federally listed threatened species and a state-listed species of special concern. This large fish occurs predominately in the northeastern Gulf of Mexico, feeding in offshore areas and inland bays during the winter months and moving into freshwater rivers during the spring to spawn. Migration into fresh water generally occurs from March to May, while migration into salt water occurs from October through November (U.S. Air Force, 2006).

The USFWS designated Gulf sturgeon critical habitat in 2003 in multiple Gulf of Mexico rivers, bays, and the Gulf itself. Federally designated critical habitat is defined as specific areas that contain physical or biological features essential to the species' conservation and that may require special management considerations or protection. As it pertains to the Eglin Reservation, Choctawhatchee Bay (including the main body of Choctawhatchee Bay, Hogtown Bayou, Jolly Bay, Bunker Cove, and Grassy Cove, and excluding all other bayous, creeks, and rivers at their mouths/entrances), Santa Rosa Sound, Yellow River, Shoal River, Blackwater Bay, East Bay, and the Gulf of Mexico out to 1 nautical mile offshore of Santa Rosa Island (SRI) have been designated as critical habitat (Figure 3-1, Figure 3-4, and Figure 3-9). The lower rivers provide summer resting and migration habitat, and the bays, sound, and Gulf contain winter feeding and migration habitat (U.S. Air Force, 2006).

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-1

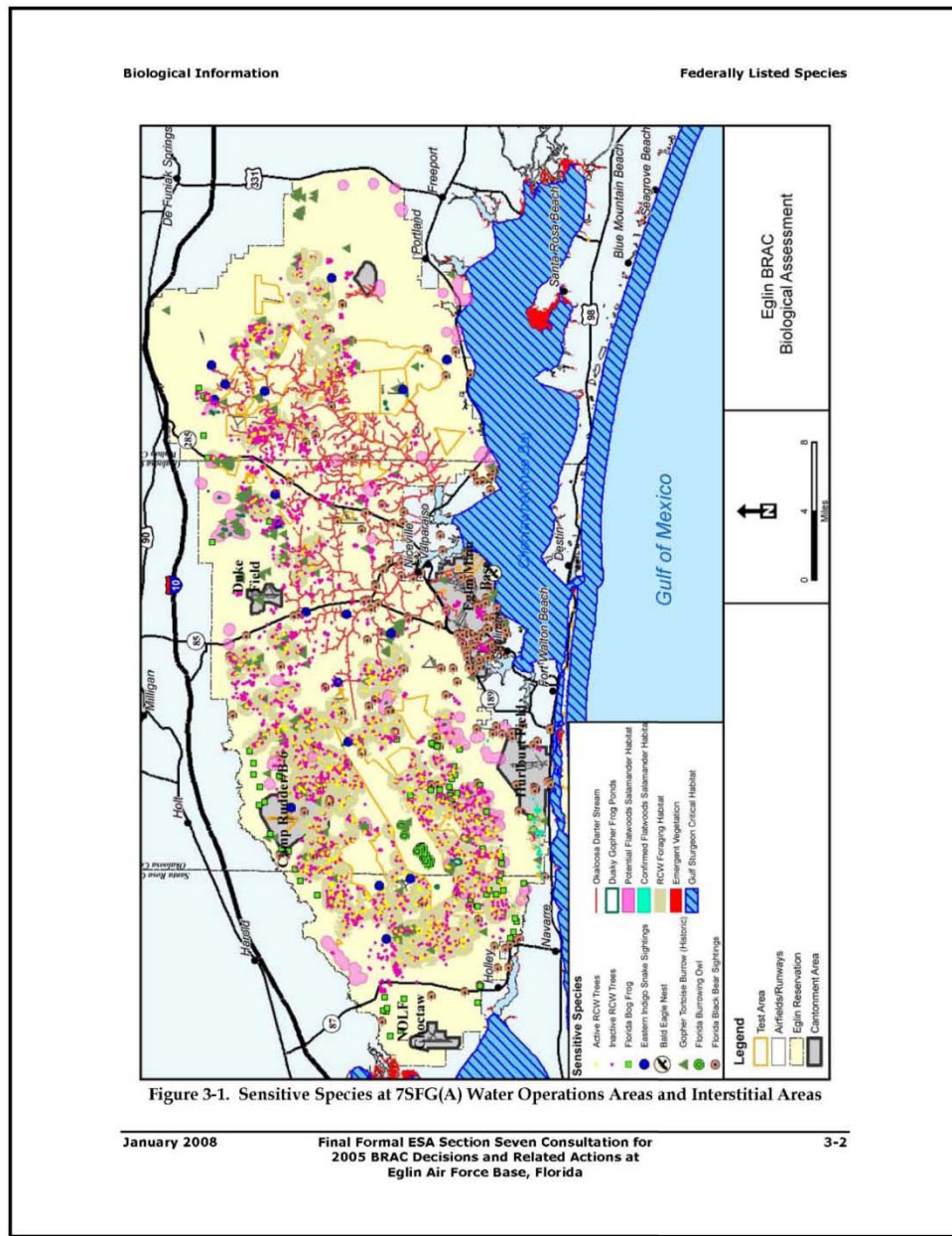
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-129

Biological Resources

Appendix H



H-130

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Federally Listed Species

3.1.2 Okaloosa Darter

The Okaloosa darter (*Etheostoma okaloosae*) is a small federally and state-listed endangered fish. Spawning occurs from March to October, with the greatest amount of activity taking place during April (USFWS, 1998). The entire global population of this species is found in the tributaries and main channels of Toms, Turkey, Mill, Swift, East Turkey, and Rocky Creeks, which drain into two bayous of Choctawhatchee Bay (Figure 3-1, Figure 3-2, Figure 3-3, Figure 3-5, and Figure 3-8). These seepage streams have persistent discharge of clear, sand-filtered water through sandy channels, woody debris, and vegetation beds. The Eglin Range contains 90 percent of the 457-square-kilometer (176-square-mile) drainage area. The remaining portions of the watershed are within the urban areas of Niceville and Valparaiso (U.S. Air Force, 2006). Over 97 percent of Okaloosa darters are found on Eglin AFB (Tate, 2007).

Due to a recovery plan that Eglin AFB implemented for the Okaloosa darter in 1998, the darter is currently under federal status review for potential downlisting from endangered to threatened. To ensure down-listing of the Okaloosa darter, Eglin AFB is protecting instream flows and historical habitat through management plans, conservation agreements, easements, and/or acquisitions; is implementing an effective habitat restoration program to control erosion from roads, clay pits, and open ranges; is demonstrating that the Okaloosa darter population is stable or increasing and that the range of the Okaloosa darter has not decreased at all historical monitoring sites; and is seeing that no foreseeable threats exist that would impact the survival of the species. The Eglin NRS is about 95 percent complete with erosion control projects in darter watersheds and will soon be entering the maintenance phase (U.S. Air Force, 2006).

3.1.3 Flatwoods Salamander

The flatwoods salamander (*Ambystoma cingulatum*) is federally listed as threatened and is a state species of special concern. Optimal habitat for this small mole salamander is open, mesic (moderately wet) woodlands of longleaf or slash pine flatwoods maintained by frequent fires and that contain shallow, ephemeral wetland ponds. Males and females migrate to these ephemeral ponds during the cool, rainy months of October through December. The females lay their eggs in vegetation at the edges of the ponds. Flatwoods salamanders may disperse long distances from breeding sites to upland sites where they live as adults (U.S. Air Force, 2006).

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-3

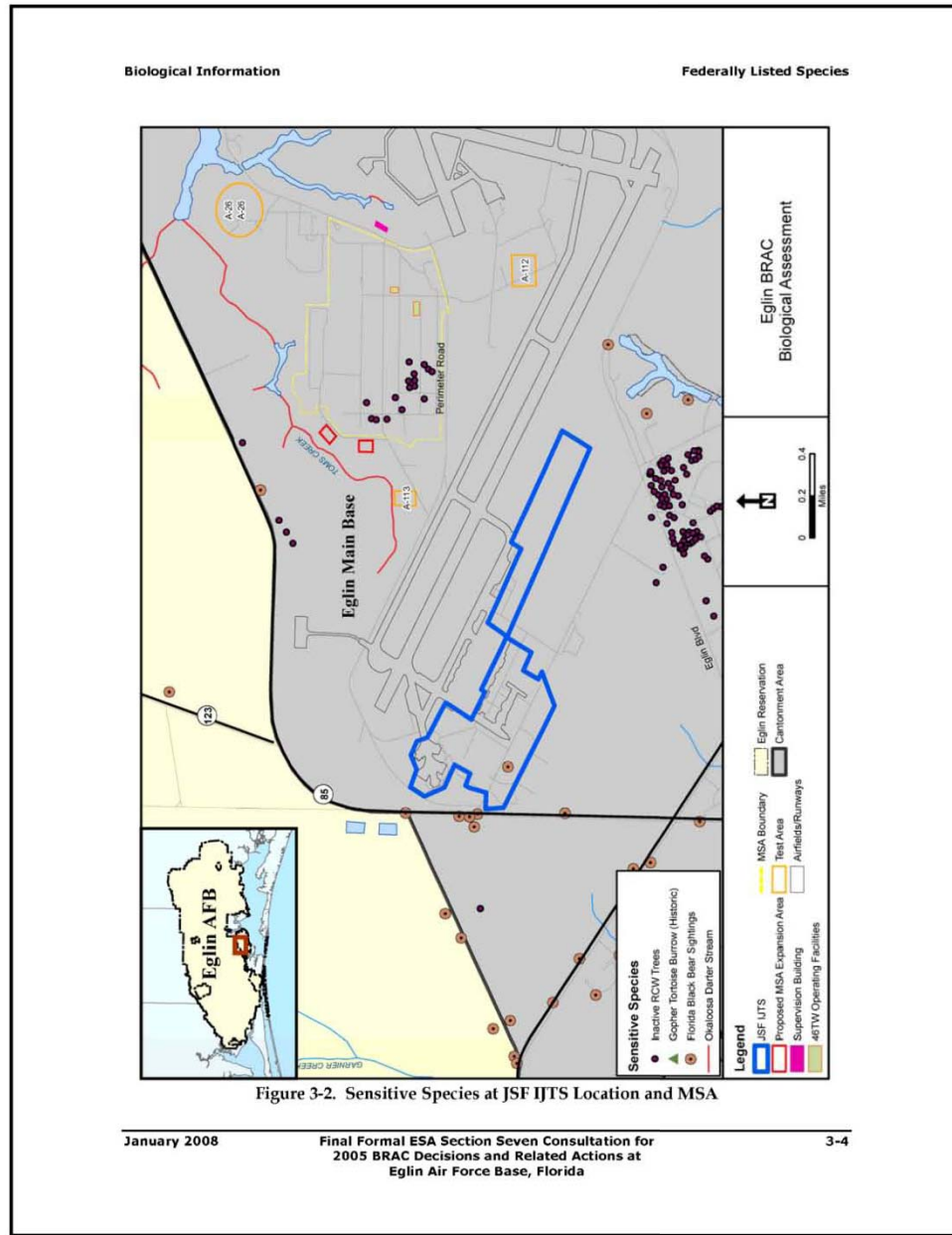
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-131

Biological Resources

Appendix H



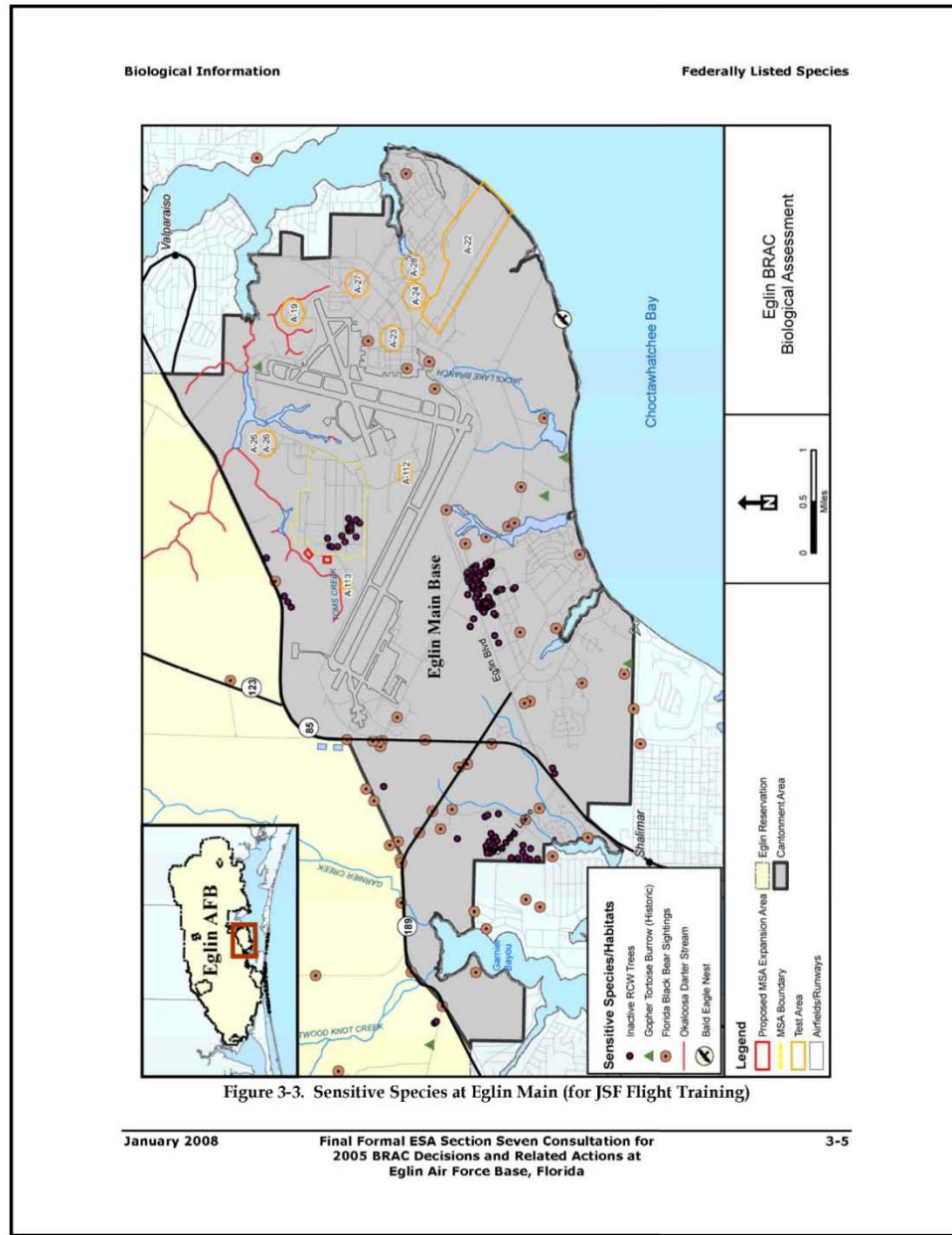
H-132

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources



October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-133

Biological Resources

Appendix H

Biological Information

Federally Listed Species

There are 18 known breeding ponds for the flatwoods salamander on the Eglin Range, and approximately 17,000 acres of potential salamander habitat in mesic flatwoods (Figure 3-1, Figure 3-4, Figure 3-5, Figure 3-6, Figure 3-8, and Figure 3-9). Flatwoods salamanders and their active breeding wetlands both appear to have declined in number since the original Eglin surveys in 1993 and 1994. This is possibly due in part to several years of drought in the late 1990s and early 2000s. Breeding wetlands may not have remained wet long enough for larvae to complete metamorphosis if rainfall amounts were not sufficient. This has resulted in little population recruitment over the last decade at Eglin's wetlands (U.S. Air Force, 2006).

The USFWS guidelines in the *Federal Register*, dated 01 April 1999, establish a 450-meter (1,476-foot) buffer area from the wetland edge of confirmed breeding ponds. Within the buffer area, the guidelines restrict ground-disturbing activities in order to minimize the potential for direct physical impacts to salamanders, the introduction and spread of invasive non-native plant species, and alterations to hydrology and water quality.

3.1.4 Piping Plover

The piping plover (*Charadrius melodus*) is a federally and state threatened bird. Nonbreeding (migration and wintering) piping plover season along the Gulf Coast is 15 July through 15 May. Piping plovers migrate to northern areas to breed. In Gulf Coast areas, piping plovers are known to forage in exposed wet sand such as wash zones, intertidal ocean beachfronts, wrack lines, washover passes, mud and sand flats, ephemeral ponds, and salt marshes. They are also known to use adjacent areas for sheltering in dunes, debris, and sparse vegetation. Studies have shown that nonbreeding plovers spend 76 percent of their time foraging for invertebrates found just below the surface of wet sand (U.S. Air Force, 2006).

On SRI's Eglin property, critical habitat is located on the north shore, near Test Site (TS) A-18 (Figure 3-9). Critical habitat at the site includes land from the Mean Lower Low Water Line to where densely vegetated habitat, not used by the piping plover, begins and where the constituent elements no longer occur. Areas used by piping plovers are ephemeral habitats that change over time, so when surveys document new active locations, these areas will be given the same protection afforded the piping plover critical habitat units already established (U.S. Air Force, 2006). Prior to 2006, periodic shorebird surveys were conducted on SRI during the nonbreeding season, including participation in the International Piping Plover Census in January of 1991, 1996, 2001, and 2006. Piping plovers were not sighted on Eglin's SRI property during any of these official surveys. Beginning in 2006, Eglin NRS has conducted bimonthly shorebird monitoring surveys according to piping and snowy plover winter survey guidelines provided by the USFWS. Those guidelines combine the survey protocol from the International Piping Plover Census and the International Shorebirds Survey. Since the bimonthly surveys began, the NRS has documented piping plovers at seven locations during 2006 (total of 13 birds), and 13 locations thus far in 2007 (total of 29 birds). Almost all sightings have been within 500 meters of the designated critical habitat.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-6

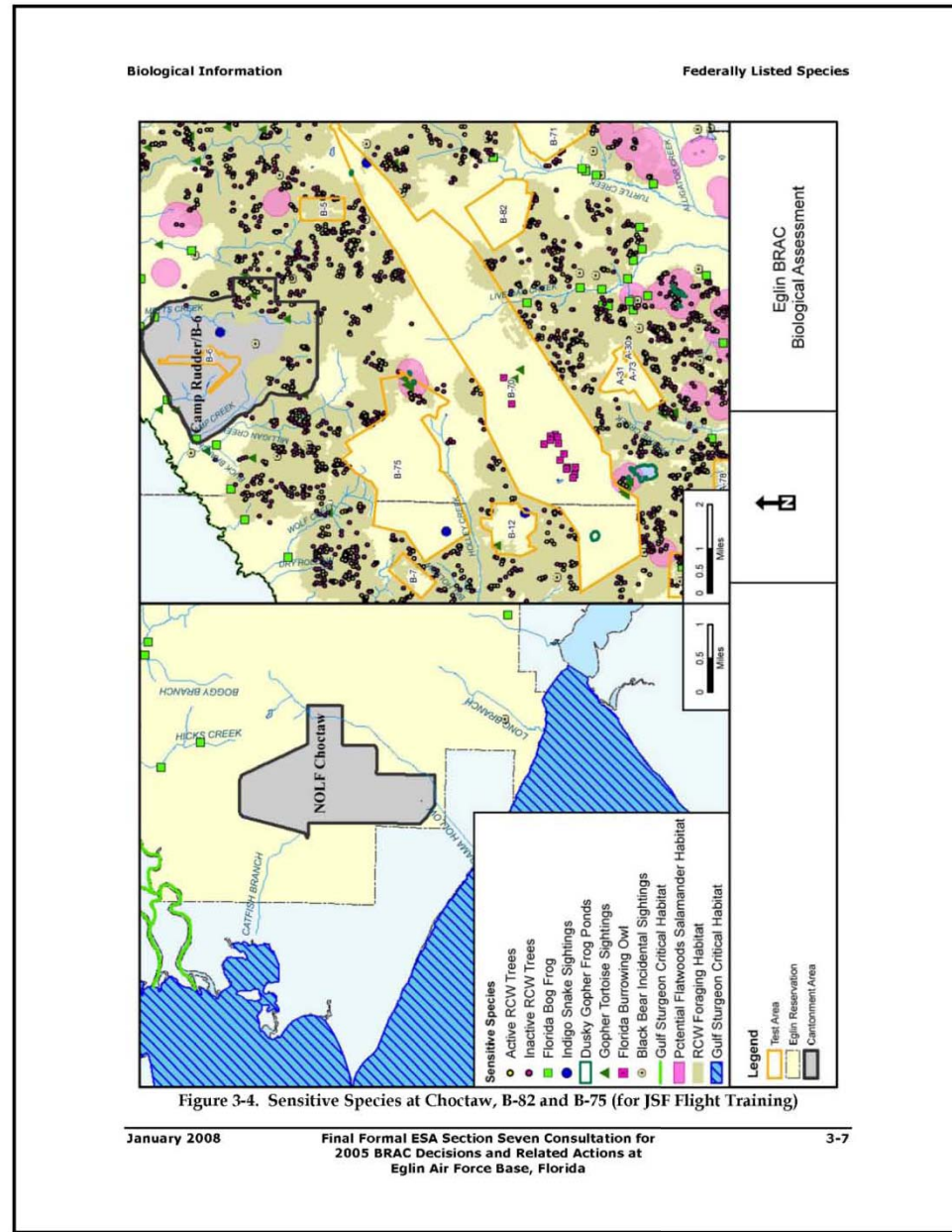
H-134

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources



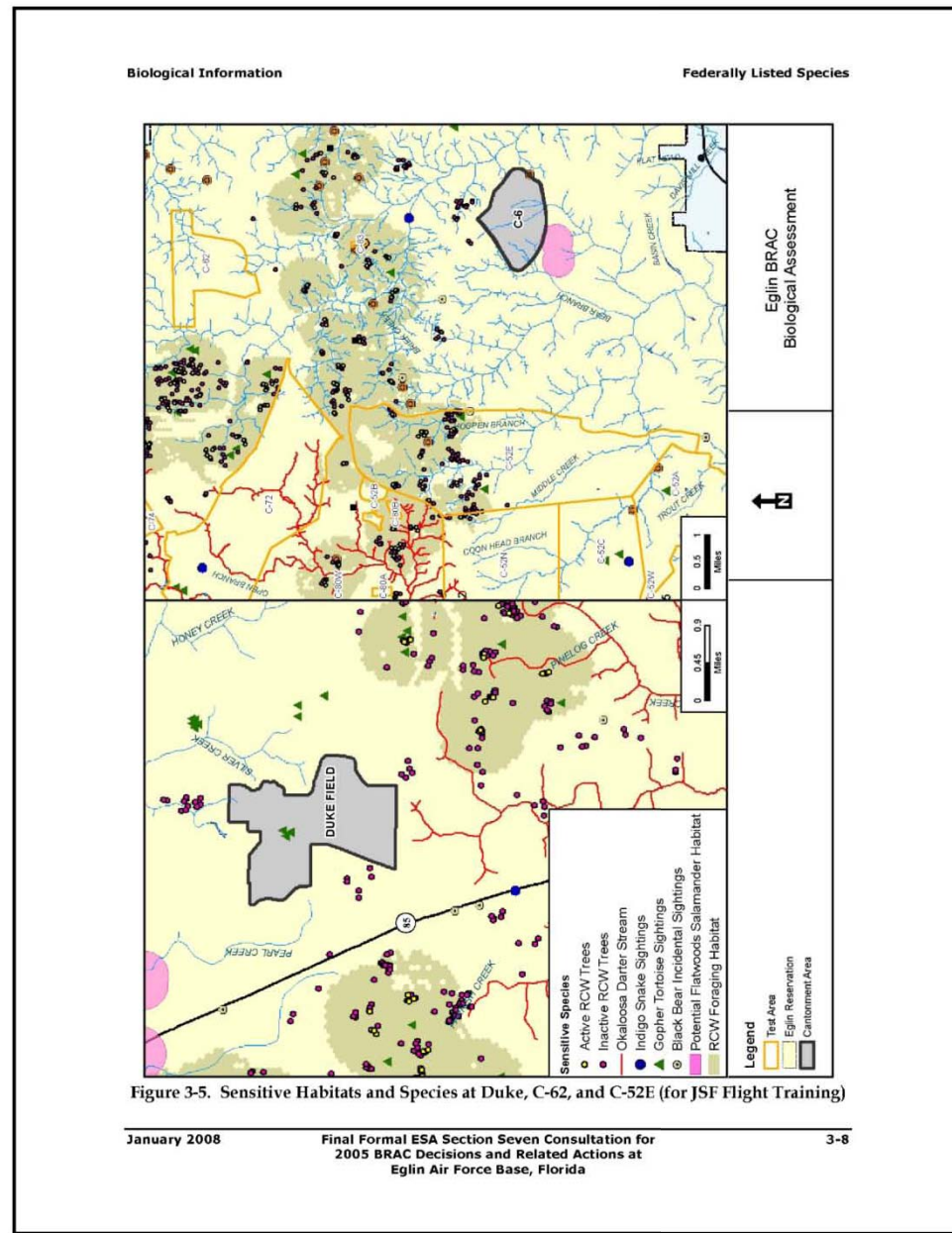
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-135

Biological Resources

Appendix H



H-136

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Federally Listed Species

3.1.5 Red-cockaded Woodpecker

The red-cockaded woodpecker (RCW) (*Picoides borealis*) is listed as a federally endangered bird species and a state species of special concern. The RCW excavates cavities in live longleaf pine trees that are at least 85 years old. The RCW historically had a habitat range as far north as New Jersey and as far west as Oklahoma. Today, the RCW has been restricted to the southeastern United States, from Florida to Virginia and to southeast Texas, due to a loss of habitat. In the southeast, 98 percent of the longleaf pine forests have been removed, making relatively undeveloped federal lands such as Eglin AFB primary habitat for the species. Due to the preservation of continuous longleaf pine forests on Eglin, the Eglin Range has one of the largest remaining populations of RCWs in the country (Figure 3-1 to Figure 3-9). In 2003, the USFWS identified Eglin AFB as 1 of 13 primary core populations for the RCW (U.S. Air Force, 2006). The Eglin population goal is 350 Potential Breeding Groups (PBGs). The number of PBGs at Eglin has been increasing since 1994, with the current population at 366 active clusters and an estimated 317 PBGs.

The Eglin NRS geographic information system (GIS) database includes the locations of active RCW cavity trees (tree containing one or more cavities that are utilized by the RCW) and inactive RCW cavity trees (tree containing cavities that were once utilized by the RCW but have not shown recent activity). Inactive RCW cavities are spatially recorded. The NRS also maps RCW foraging habitat around active clusters of RCW cavities in the GIS. Consultation guidelines require that military training within 200 feet of marked cavity trees be limited to military activities of a transient nature (less than two hours occupation), and military vehicles are prohibited from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road or maintained trail or firebreak. Prohibited activities within the 200-foot buffer include bivouacking, excavating, digging, and establishing command posts. In addition, if timber is to be removed within 0.5 mile) of active cavity trees, then a forage habitat analysis must be completed to determine potential impacts. Consultation is required if resulting resources fall below USFWS guidelines.

3.1.6 Eastern Indigo Snake

The eastern indigo snake (*Drymarchon corais couperi*) is listed as a federal and state threatened species that is the largest nonvenomous snake in North America. The primary reason for its listing is population decline resulting from habitat loss and fragmentation. Movement along travel corridors between seasonal habitats exposes the snake to danger from increased contact with humans. Indigo snakes frequently utilize gopher tortoise burrows and the burrows of others species for over-wintering. The snake frequents flatwoods, hammocks, stream bottoms, riparian thickets, and high ground with well-drained, sandy soils. The indigo snake could occur anywhere on the Eglin Range because it uses such a wide variety of habitats (U.S. Air Force, 2006).

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-9

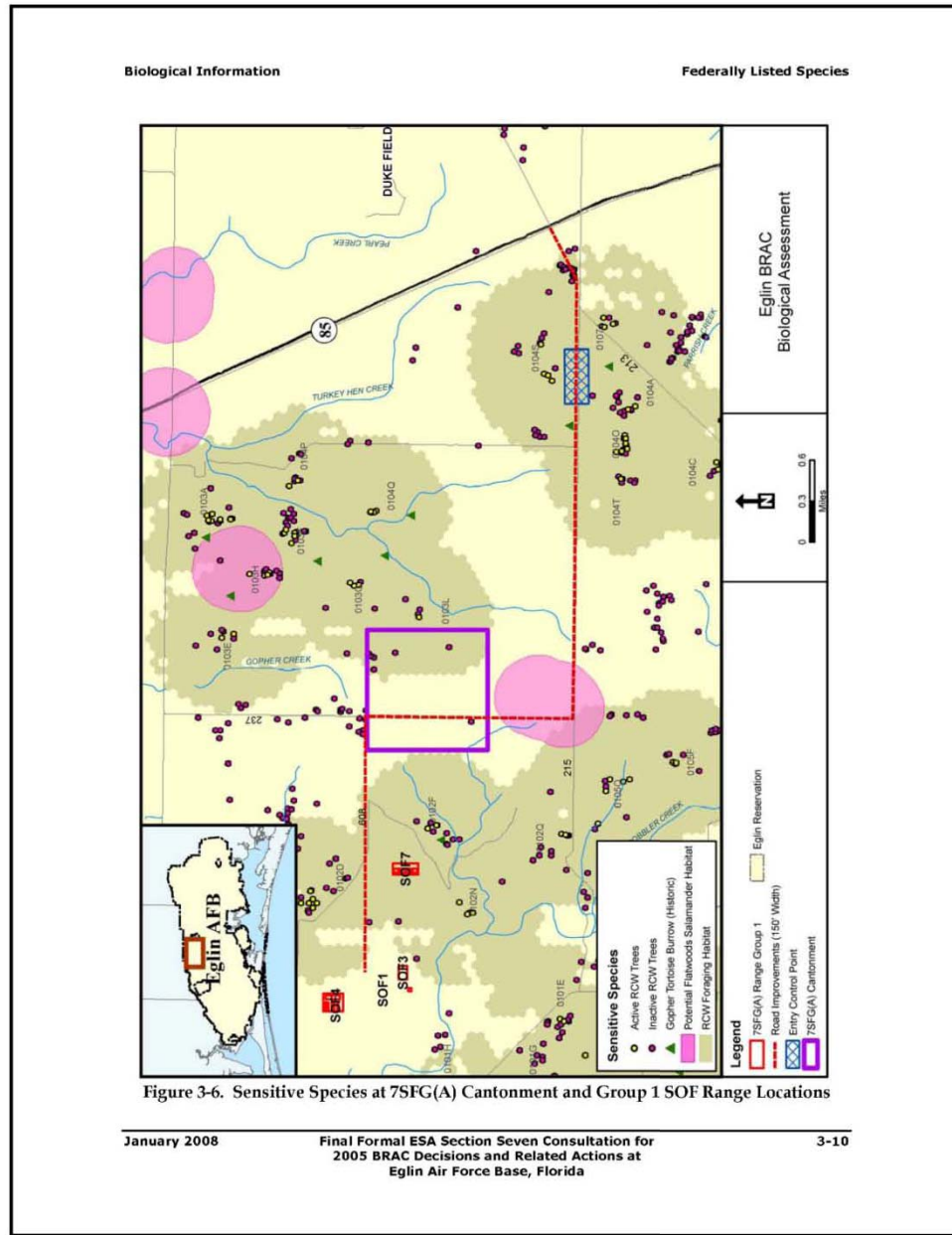
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-137

Biological Resources

Appendix H



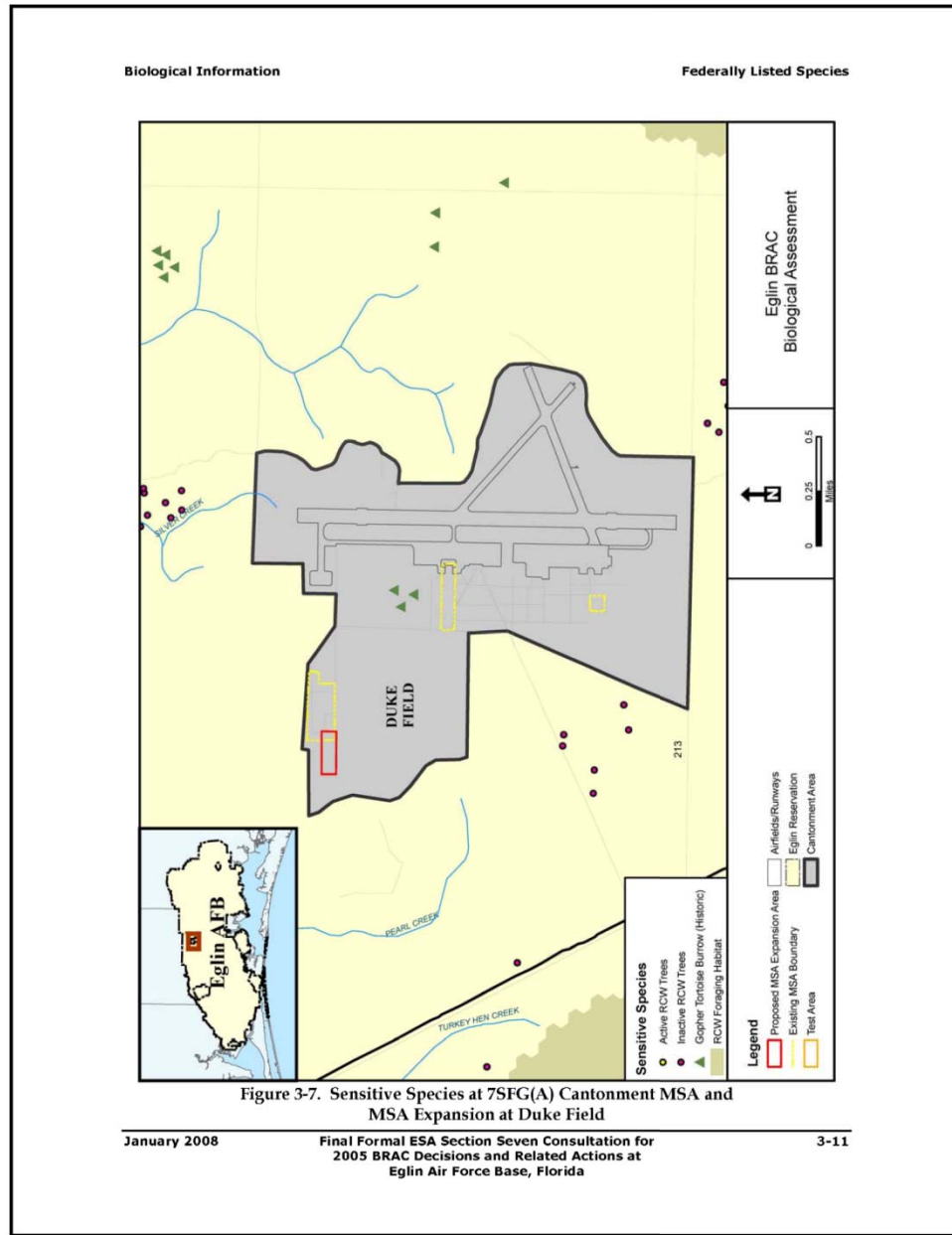
H-138

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources



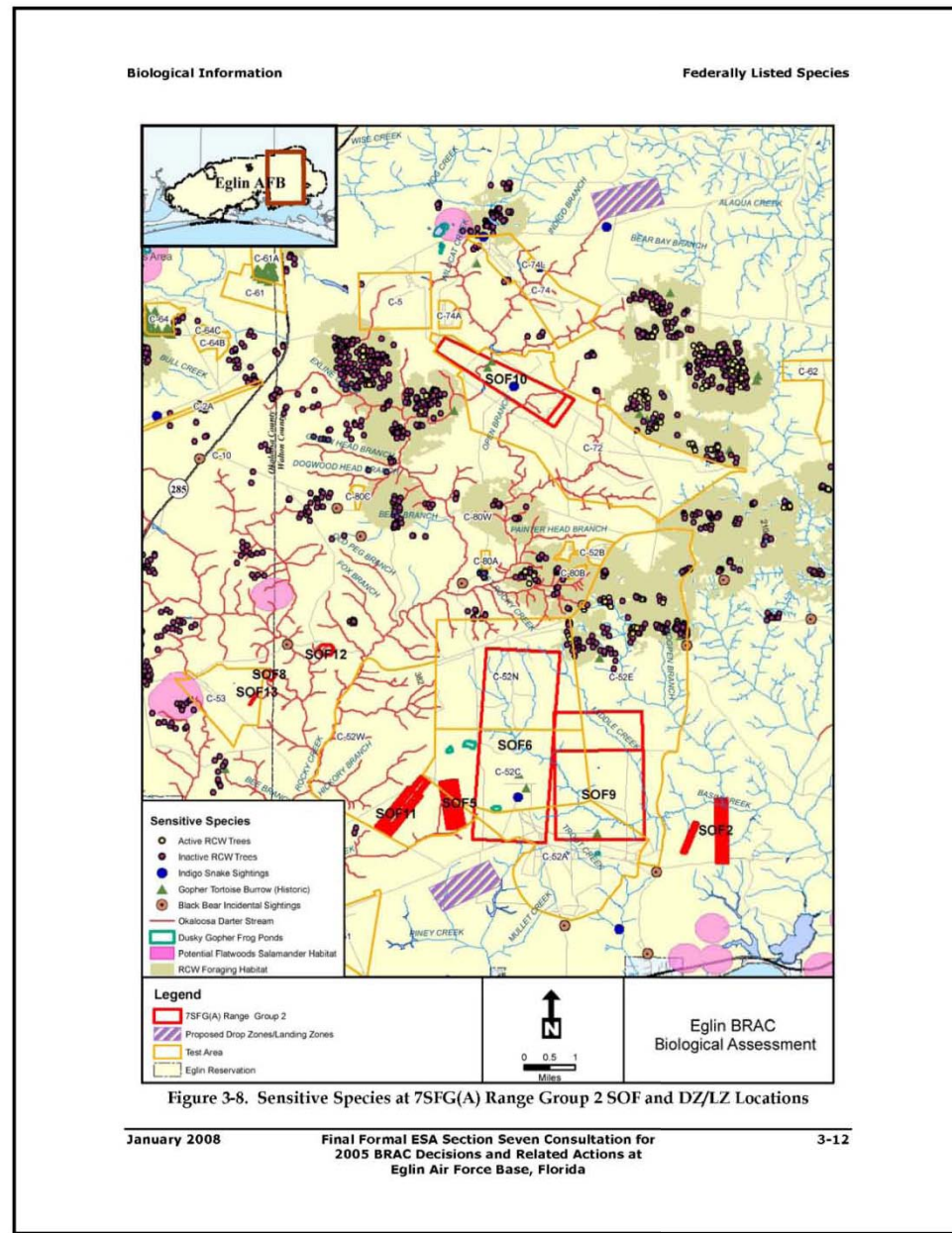
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-139

Biological Resources

Appendix H



H-140

**2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida**

October 2008

Appendix H

Biological Resources

Biological Information

Federally Listed Species

The species is extremely uncommon on the Eglin Range with the sighting of only 29 indigo snakes throughout the Eglin Range from 1956 to 1999, and no reported sightings since 1999 (Gault, 2006) (Figure 3-1, Figure 3-4, Figure 3-5, and Figure 3-8). Most of these snakes were seen crossing roads or after being killed by vehicles. It is difficult to determine a precise number or even estimate of the number of these snakes due to the secretive nature of this species (U.S. Air Force, 2006).

3.1.7 Sea Turtles**Species Description**

Three species of marine turtles found in the Gulf of Mexico have been documented to nest on Eglin AFB's SRI beaches: the Atlantic loggerhead, the Atlantic green, and the leatherback (Figure 3-9). The Atlantic loggerhead and the Atlantic green sea turtles are known to nest regularly on SRI beaches. A leatherback nest was reported one year on SRI. The officially recognized sea turtle nesting and hatching season in northwest Florida occurs from 01 May through 31 October, with most hatching occurring between mid-August and mid-October.

The Atlantic loggerhead sea turtle (*Caretta caretta*) is federally and state listed as threatened. Loggerhead nests in Florida account for 90 percent of all loggerhead nests in the United States. Their nesting sites are on the numerous barrier islands and beaches between the Florida Keys and the northern Gulf of Mexico. Nesting females approach SRI in the spring and summer and dig their nests either between the high tide mark and the dune line or sometimes between dunes (U.S. Air Force, 2006).

The Atlantic green sea turtle (*Chelonia mydas*) is listed as federally threatened throughout its eastern range around North America, except in Florida, where it is listed as endangered. It is also state listed as endangered. In the United States, it nests on south Florida beaches and also occasionally in the northern Gulf of Mexico and along the North Carolina coast. Eglin AFB's SRI property supports the highest number of green sea turtle nests in northwest Florida (U.S. Air Force, 2006).

The leatherback sea turtle (*Dermochelys coriacea*) is listed as federally and state endangered. This species commonly nests along the shorelines of the Atlantic, Pacific, and Indian Oceans. Only infrequent nesting activity has been documented for the leatherback in northwest Florida. Until the spring of 2000, the only confirmed leatherback nests in northwest Florida were in Franklin and Gulf Counties. In May and June 2000, leatherback nesting activity was documented for the first time in Okaloosa County on Eglin's portion of SRI (U.S. Air Force, 2006).

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-13

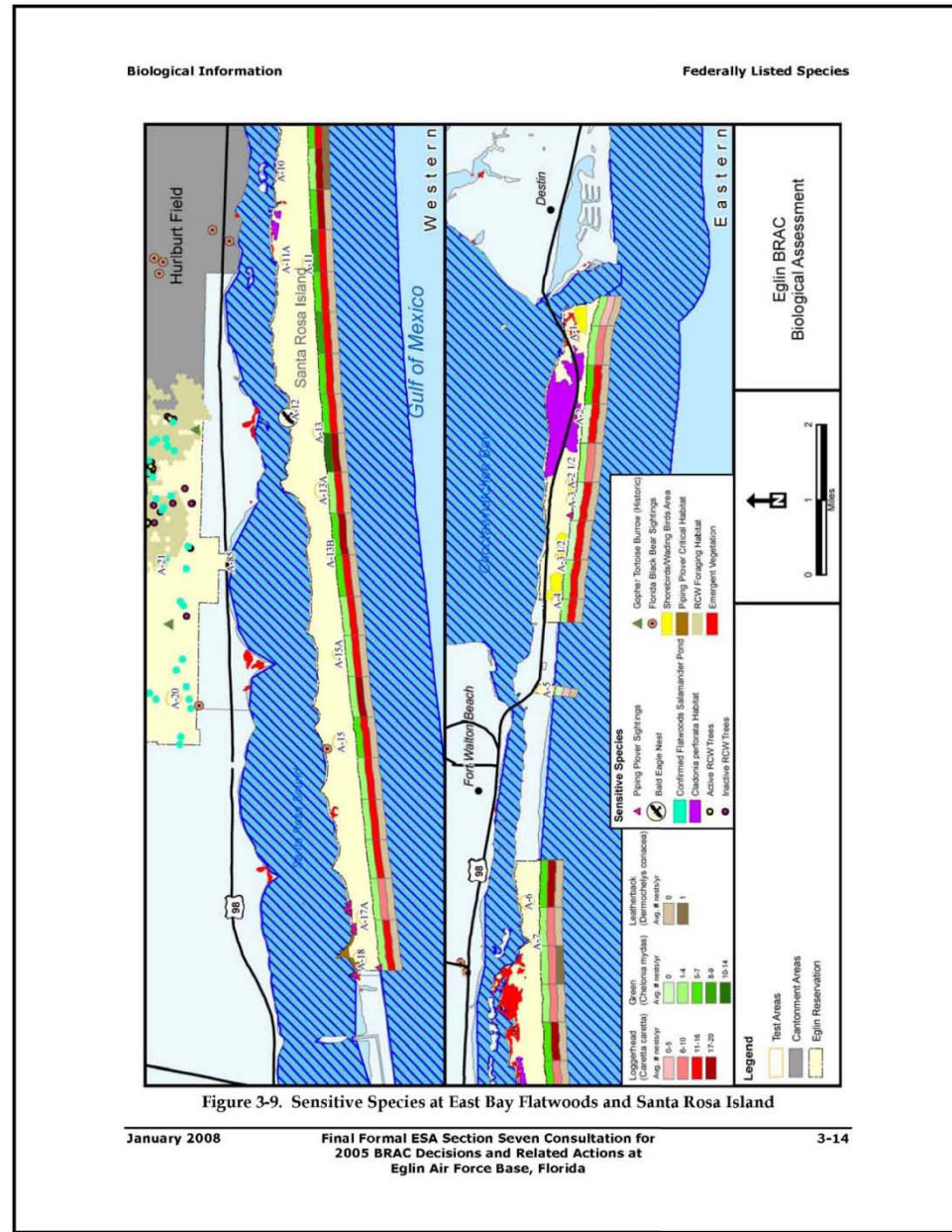
October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-141

Biological Resources

Appendix H



H-142

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Federally Listed Species

Sea Turtle Densities

For mapping purposes, beachfront at SRI was divided into half-mile survey zones, and nesting data were recorded according to the zone in which they occur. Figure 3-9 shows these zones, and also provides a color-coded indication of nesting intensity for each zone by species.

The sea turtle reproduction cycle on SRI has been divided into four time periods based on historical data (Table 3-1). During the first time period, only nesting occurs. During the second time period, hatchlings emerge from previously laid nests while adult sea turtles continue to come ashore to lay new nests. During the third time period, adults have ceased to come ashore for nesting, while hatchlings continue emerging from existing nests. During the fourth time period, neither nesting nor hatching behavior is expected to occur. The earliest and latest possible dates for all species were selected to produce the combined species time periods.

Table 3-1. Sea Turtle Nesting Periods by Species

Species	Nesting Only	Nesting and Hatching	Hatching Only	Off-Season
<i>Caretta caretta</i>	23 May - 24 Jul 24	25 Jul - 26 Aug	27 Aug - 05 Nov	06 Nov - 22 May
<i>Chelonia mydas</i>	20 May - 24 Jul	25 Jul - 22 Aug	23 Aug - 26 Oct	27 Oct - 19 May
<i>Dermochelys coriacea</i>	12 May - 19 Jun	N/A	05 Aug - 21 Sep	22 Sep - 11 May
Combined Species	12 May - 24 Jul	25 Jul - 26 Aug	27 Aug - 05 Nov	06 Nov - 11 May

Based on data collected between 1989 and 2007 on the 17 miles of Eglin SRI beaches, the average annual nesting density for loggerheads is approximately 1.19 nests per mile (Table 3-2). During this period, 383 loggerhead nests were recorded. Peak loggerhead nesting on SRI occurs in June and July, with approximately 86.1 percent of nests established during this period (Table 3-2). The average nest incubation length is 67.23 days. Loggerhead hatching peaks in August and September. The average annual nest emergence success rate is 55.7 percent. Slightly higher loggerhead nesting densities have been documented near TS A-2, between A-4 and A-3 ½, between TS A-9 and A-13B, and between TS A-15 and A-15A, with the highest densities between A-11 and A-12 (Figure 3-9).

Eglin's SRI property supports the greatest number of green sea turtle nests in northwest Florida. Green sea turtles have nested on SRI every other year from 1990 to 2002, except for one nest in 1997. However, in 2003, there were four green sea turtle nests, and in 2004 there were none. In 2005, seven nests were on SRI, six in 2006 and seven in 2007, possibly indicating a new trend. During this period, 120 green sea turtle nests were recorded (Table 3-2). The average annual nesting density for green sea turtles is approximately 0.59 nest per mile. Peak green sea turtle nesting occurs in June and July, with approximately 80.2 percent of nests established during this period (Table 3-2). The

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-15

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-143

Biological Resources

Appendix H

Biological Information

Federally Listed Species

average nest incubation length is 68.54 days, with a range from 51 to 82 days. Green sea turtle hatching peaks in August and September. The average annual nest emergence success rate is 53.78 percent. Most green sea turtle nests have been documented between TS A-7 and A-13B, with highest densities near A-13 (Figure 3-9).

Leatherback nesting has been documented only one year on Eglin SRI, during 2000. Three nests were laid in May and June and hatched in August and September. The three nests were located between TSs A-7 and A-10 (U.S. Air Force, 2006).

Loggerhead nesting peaks in June (Figure 3-10). Dividing the average number of nests occurring in June by 30 days yields a peak nesting emergence rate of 0.33 nest per night. By the same method, during a green turtle nesting year, the peak nesting rate is calculated to be 0.15 nest per night (number of green turtle nests in July, divided by 31 days). To determine the peak nesting rate within a half-mile section of beachfront, the peak nesting emergence rate for each species is divided by the number of half-mile segments comprising Eglin AFB sea turtle nesting beach (i.e., 34). Therefore, the peak rate of loggerhead turtle nesting emergences is 0.001 nest per night per half-mile, and the peak rate of green turtle nesting emergences is 0.004 nest per night per half-mile. Because only three leatherback nests have been documented on Eglin AFB SRI over a 19-year period, the leatherback nesting emergence rate is effectively nil.

Table 3-2. Sea Turtle Nesting on SRI, Eglin AFB

	Loggerhead	Green	Leatherback
Total number nests	383	120	3
Years nesting documented	1989-2007	1990, 1992, 1994, 1996, 1997, 1998, 2000, 2002, 2003, 2005, 2006, 2007	2000
Earliest documented nest	23 May	20 May	12 May
Latest documented nest	26 Aug	22 Aug	19 June
Average annual number of nests	20.15	10	insufficient data
Average annual number of nests per mile	1.19	.59	insufficient data
Peak nesting period (two peak months)	June and July	June and July	insufficient data
Percentage of nests laid during the two peak months	86.1%	80.83%	insufficient data
Peak hatching period (two peak months)	August and September	August and September	insufficient data
Average number eggs in a nest	112.6	136.1	insufficient data

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-16

H-144

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Federally Listed Species

Table 3-2. Sea Turtle Nesting on SRI, Eglin AFB, Cont'd

	Loggerhead	Green	Leatherback
Average annual nest emergence success rate	55.7%	53.78%	insufficient data
Incubation period (range)	52-89 days	51-82 days	insufficient data
Incubation period (average)	67.23 days	68.54 days	insufficient data
Estimated number of hatchlings produced annually*	2395	1361	insufficient data

*Assumes 100 percent survival

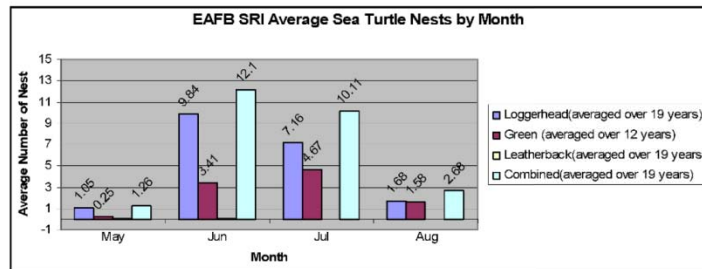


Figure 3-10. Eglin AFB SRI Average Sea Turtle Nest Occurrences by Month (1989-2007)

Because historical hatchling emergence data for Eglin AFB SRI are incomplete, an expected average emergence by month was calculated for each species based on the available emergence data. For example, hatchling emergence dates have been recorded for 210 of 383 total loggerhead nests. Of the 210 recorded hatching dates, only four (1.9 percent) occurred in July. If this percentage is applied to the total number of loggerhead nests recorded, 7.3 loggerhead nests would be expected to have hatched in July over the 19-year data collection period, yielding an average of 0.38 loggerhead hatchlings annually during the month of July. Once again, the total for green sea turtles was averaged over 12 years and the combined average is over 19 years. Table 3-3 summarizes this information and also provides an estimated number of hatching events expected in each given month. Emergence dates are not available for a randomly selected sample of nests for each species, and therefore these averages may be slightly skewed. However, because emergence dates were available for 276 out of the 506 total nests (55 percent), the calculated averages for the number of nests hatching per month should suffice for purposes of this analysis (Table 3-3).

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-17

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-145

Biological Resources

Appendix H

Biological Information

Federally Listed Species

Table 3-3. Eglin AFB SRI: Calculated Average Sea Turtle Hatching Occurrences by Month

Measurement	Loggerhead	Green	Leatherback	Combined
Total Nests	383	120	3	506
Nests with recorded hatching dates	210	64	2	276
July Calculated Average	.38	.33	0.0	.579
August Calculated Average	10.27	2.99	0.0	12.15
September Calculated Average	7.49	4.69	.18	10.61
October Calculated Average	1.82	2.03	0.0	3.09
November Calculated Average	.192	0.0	0.0	.193

3.1.8 Perforate Lichen

The Florida perforate lichen (*Cladonia perforata*) is state and federally listed as endangered. It is endemic to Florida, occurring in three very disjunct locations: Eglin AFB, Lake Wales Ridge, and the length of Florida's eastern coastline. This lichen occurs at fewer than 30 sites throughout its range, most of which are threatened by habitat loss due to development or agricultural conversion, human disturbance, and hurricane overwash. Three of the known populations occur on Eglin AFB SRI property (Figure 3-9). One population persists on the eastern portion of Eglin AFB SRI property. Two reintroduction populations were established in June 2000 near TS A-10 on the north side of SRI where populations were lost to Hurricane Opal (U.S. Air Force, 2006).

3.1.9 Freshwater Mussels

The southern sandshell (*Lampsilis australis*), fuzzy pigtoe (*Pleurobema strodeanum*), southern kidneyshell (*Ptychobranhus jonesi*), and Choctaw bean (*Villosa choctawensis*) freshwater mussels are federal candidates for listing as threatened or endangered species. These species are found only in the Yellow, Escambia, and Choctawhatchee River drainages in Florida and Alabama. From the 1990s to 2004, surveys have documented declines in the number of these mussel species (Blalock-Herod et al., 2002; Pilarczyk et al., 2006). Furthermore, these surveys have been unable to capture many of these species at sites where they were previously known to occur. Local extirpations and reductions in numbers are attributed to habitat alteration from various sources.

The greatest threat to these freshwater mussels is runoff associated with poor land use practices, such as poorly conducted agricultural or silvicultural practices, construction, and mining activities. Because of their limited motility, mussels are extremely vulnerable to acute, localized impacts (i.e., impoundment, runoff from adjacent unvegetated land). Mussels filter fine particulate organic matter from the water, so excess sedimentation may interfere with feeding. Sedimentation may also cause direct mortality by deposition and suffocation, and turbidity may reduce or eliminate juvenile recruitment. Pesticides and other water quality issues also threaten the health of these filter feeders. Preferred habitats are creeks and rivers with slow to moderate currents and sandy substrates.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-18

H-146

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Other Species Considered

3.2 OTHER SPECIES CONSIDERED**3.2.1 Gopher Tortoise**

The gopher tortoise (*Gopherus polyphemus*) is a state threatened species. The tortoise is found primarily within the sandhills and open grassland ecological associations on the Eglin Range, where it excavates a tunnel-like burrow for shelter from climatic extremes and refuge from predators (Figure 3-1 to Figure 3-9). The primary features of good tortoise habitat are sandy soils, open canopy with plenty of sunlight, and abundant food plants (forbs and grasses). Prescribed fire is often employed to maintain these conditions. Nesting occurs during May and June and hatching occurs from August through September. Gopher tortoise burrows serve as important habitat for many species, including the federally listed eastern indigo snake (U.S. Air Force, 2006).

3.2.2 Florida Black Bear

The Florida black bear (*Ursus americanus floridanus*) is currently listed as a state threatened species except in Baker and Columbia Counties and in Apalachicola National Forest. Florida black bear populations are currently found in Florida and Georgia, and there is also a small population in Alabama. Eglin AFB has the smallest population, with an estimated 60 to 100 individuals; however, Eglin's black bear population has shown signs of increase since the early 1990s (Figure 3-1 to Figure 3-5, Figure 3-8, and Figure 3-9). Reasons for population declines include loss of habitat due to urban development and direct mortality due to collisions with vehicles. Black bear in Florida breed in June-July, and young are born in January-February. Most black bears within the Eglin Range utilize the large swamps and floodplain forests in the southwest and northern portions of the Eglin Range, where they feed on fruits, acorns, beetles, and yellow jackets. Black bear sightings have occurred at numerous locations throughout the Eglin Range, the majority of which have been within the interstitial areas (U.S. Air Force, 2006).

3.2.3 Santa Rosa Beach Mouse

The Santa Rosa beach mouse (*Peromyscus polionotus leucocephalus*) is one of eight beach mouse subspecies and is the only extant subspecies not currently listed by the state or federal government. This subspecies occurs only on SRL. Potential beach mouse habitat covers all of Eglin AFB property on SRL, but their preferred habitat is frontal dune and scrub vegetation within the coastal dune ecosystem. Habitat fragmentation and isolation of suitable habitat are thought to be threats to the beach mouse (U.S. Air Force, 2006).

3.2.4 Florida Bog Frog

The Florida bog frog (*Rana okaloosae*) a species of special concern by the state, can only be found within Walton, Okaloosa, and Santa Rosa Counties. Most of the habitat for the frog lies on Eglin AFB property with all known locations of the frog in small tributary

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-19

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-147

Biological Resources

Appendix H

Biological Information

Other Species Considered

streams of the Yellow, Shoal, and East Bay Rivers (Figure 3-1 and Figure 3-4). There are 65 documented bog frog locations on the Eglin Range, but only 58 of those have been verified (U.S. Air Force, 2006).

3.2.5 Dusky Gopher Frog

The dusky gopher frog (*Rana capito sevosa*), a state species of concern, is associated with gopher tortoise habitat, as it uses gopher tortoise burrows for cover, but is also known to flourish where tortoises no longer occur. It also uses old field mouse burrows, hollow stumps, and other holes for cover. The species requires nearby seasonally flooded grassy ponds, depression marshes, or Sandhills upland lakes that lack fish populations, found within the Sandhills ecological association, for breeding. They have been found in the longleaf pine, turkey oak, pine flatwood, sand pine scrub, and xeric hammock open or forested communities of the Sandhills and Open Grassland/Shrubland ecological associations up to two kilometers from the breeding ponds. Eglin supports the largest known concentration of reproductive sites of the dusky gopher frog subspecies anywhere within its range (Florida Natural Areas Inventory [FNAI], 1993) (Figure 3-1, Figure 3-4, and Figure 3-8).

3.2.6 Pine Barrens Tree Frog

The pine barrens tree frog (*Hyla andersonii*), a state species of concern, is a small (approximately 13-mm [1.5-inch]) lime-green frog with a maroon/brown stripe on its sides and a white belly. It is typically found in herbaceous and shrubby bogs of the Wetland/Riparian ecological association, near clear, shallow water along the Blackwater and Yellow Rivers and Choctawhatchee Bay. Breeding occurs between March and September, with tadpoles emerging between May and August. Stream and water quality degradation and hardwood forest encroachment are the main threats to this species (FNAI, 2001).

3.2.7 Florida Pine Snake

The Florida pine snake (*Pituophis melanoleucus mugitus*), a state species of concern, inhabits dry areas such as the longleaf pine, oak woodlands, and sand pine scrub communities found within the Sandhills ecological association. The species is physically adapted for digging into loosely packed sand. It also enters into rodent burrows and occasionally into gopher tortoise burrows.

3.2.8 Shorebirds and Wading Birds

Shorebirds and wading birds on Eglin AFB beach property include the state threatened least tern (*Sterna antillarum*) and southeastern snowy plover (*Charadrius alexandrinus*), and two state species of special concern: the black skimmer (*Rynchops niger*) and brown pelican (*Pelecanus occidentalis*). These birds breed and nest in a variety of habitats on SRI, including open, flat areas, wrack line habitats, and coastal ponds. Shorebird

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-20

H-148

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Biological Information

Other Species Considered

nesting season runs from 01 April through 31 August. Locations of shorebird colonies are variable from year to year depending on changes in habitat conditions as a result of hurricanes and other strong storms. Colonies have been documented in several locations along the length of SRI (Figure 3-9).

3.2.9 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is listed as a state threatened species and is protected by the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act. Eagles are territorial and exhibit a strong affinity for a nest site once a nest has been established. It is common for a breeding pair to rebuild damaged or lost nests in the same tree or in an adjacent tree. Individual pairs return to the same territory year after year and territories are often inherited by subsequent generations. The nesting period in the southeast United States extends from 01 October to 15 May with most nests completed by the end of November (U.S. Air Force, 2006). Most eagles migrate north during the hot summer season. Bald eagles are known to nest at two locations at Eglin: Eglin Main Base between Cobbs Overrun and TA A-22, and near A-12 on SRI (Figure 3-1, Figure 3-3, and Figure 3-9). The pair of eagles at the Eglin Main Base site has fledged one to two birds per year in most years, but in some years no young were fledged (U.S. Air Force, 2006).

Eglin AFB follows the *USFWS National Bald Eagle Management Guidelines for the bald eagle in the Southeast Region* (USFWS, 2007). The guidelines limit certain types of activities near nests during breeding season (01 October to 15 May), as follows:

- Aircraft activity should not take place within 1,000 feet of the nest during breeding season.
- If visible from the nest, foot traffic should remain at least 330 feet from the nest.
- Boat traffic should maintain a buffer of 330 feet when possible, but small motorized boats may pass within 330 feet of the nest if the boats minimize trips and avoid stopping in the area.

3.2.10 Southeastern American Kestrel

The southeastern American kestrel (*Falco sparverius paulus*), a state threatened species, is a common permanent resident of Eglin. This small raptor typically preys on small rodents, reptiles, and insects in clearings or woodland edges. The species can be found within the sandhills and open grassland/shrubland areas of Eglin, and may occur on or near any of the test areas at Eglin.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-21

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-149

Biological Resources

Appendix H

Biological Information

Other Species Considered

This page is intentionally blank.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

3-22

H-150

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

4. DETERMINATION OF IMPACTS

Based on the scope of the Proposed Action, as described above, potential impacts to sensitive species from 7SFG(A) and JSF activities (land clearing, construction, daily cantonment operations, air operations, water operations, ground maneuvering, munitions use, and pyrotechnics use) can be categorized as follows:

- Direct Physical Impacts – Physical harm (i.e., injury or mortality) to listed species as a result of human activities. The main cause of direct physical impacts associated with the Proposed Action is physical contact, which could involve the crushing/trampling of, or collision with, a species due to vehicle traffic, watercraft use, or human movements resulting in physical damage or mortality of a species.
- Harassment – Actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Activities under the Proposed Action may result in harassment due to the following:
 - Nest/burrow destruction – Destruction of a nest or burrow due to excessive ground disturbance, causing a species to relocate.
 - Foraging/nesting disturbance – Disruption of normal breeding/nesting or foraging activity.
- Habitat Impacts – Habitat impacts include loss, alteration, and/or degradation of habitat. These impacts characterize the physical damage, stress, or disruptions that may adversely alter or degrade the habitats essential to the sustainment of a species. A habitat in this instance refers to the ecological and geomorphological components, such as vegetation, soil, topography, and water that support listed species. Activities under the Proposed Action may result in habitat impacts due to the following:
 - Soil erosion – Loss of soil due to vehicular traffic, human movements, construction, or other activities that involve the destruction or removal of vegetative ground cover occurring in or near sensitive species habitat resulting in habitat loss, alteration, or degradation.
 - Sensitive habitat destruction – Destruction or degradation of sensitive habitats such as sand dunes, wetland areas, or foraging habitat resulting from human activities (i.e., construction, driving, fire suppression, etc.) having a negative impact.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-1

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-151

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

4.1 FEDERALLY LISTED SPECIES

No sensitive species are present at or near the existing Duke MSAs or the proposed MSA expansion area for 7SFG(A) cantonment activities (Figure 3-7). Thus, 7SFG(A) MSA activities would have no effect on federally listed species.

4.1.1 Gulf Sturgeon

Eglin has previously approved certain landing sites at the following locations for water operations: Yellow River, East Bay River, East Bay, Santa Rosa Sound, Choctawhatchee Bay, and SRI (Figure 2-2). The landings associated with the 7SFG(A) (140 per year) will not result in any large increase in shoreline, small-boat landings compared to that which currently occurs as part of normal Eglin operations (approximately 1,500 per year at a number of landing sites throughout the reservation). Due to their shallow draft, Zodiac boats have little possibility of direct physical impacts to the federally threatened Gulf sturgeon.

As a result, 7SFG(A) water operations are not likely to adversely affect the Gulf sturgeon.

4.1.2 Gulf Sturgeon Critical Habitat

Boat landings will occur only at designated boat landing areas, most of which do not have any emergent vegetation (Figure 2-2). In areas where emergent vegetation is present, boats will avoid the vegetation. Due to their shallow draft, Zodiac boats will cause very little disruption to river, bay, and surfzone bottoms, including Gulf sturgeon critical habitat.

As a result, 7SFG(A) water operations are not likely to adversely modify Gulf sturgeon critical habitat.

4.1.3 Okaloosa Darter

Excess sedimentation is the major threat to stream habitats of the federally endangered Okaloosa darter; therefore, minimization of erosion in Okaloosa darter watersheds is extremely important. To protect the habitat of the Okaloosa darter, the 7SFG(A) will use established roads, trails, and bridges when troops and vehicles are crossing Okaloosa darter streams. Additionally, ground disturbing activities, such as off-road vehicle use, bivouac, and fighting positions, will be restricted near darter streams.

The north DZ/LZ and seven of the 7SFG(A) ranges will either cross or be in close proximity to Okaloosa darter streams. The 7SFG(A) Range 10 on C-72 will cross two Okaloosa darter streams (Figure 3-8); however, most of C-72 is open grassland/shrubland, therefore minimal clearing will be necessary. Ranges 5, 8, 12, and

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-2

H-152

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

flatwoods salamander ponds to reduce the potential for chemical and sedimentation impacts.

The increase in munitions and pyrotechnics use from 7SFG(A) and JSF activities will increase the number of wildfire starts on Eglin AFB. Fires are usually beneficial in restoring natural communities, but it is unknown whether the wildfires potentially associated with the Proposed Action will have a net positive or negative effect on the flatwoods salamander. The flatwoods salamander requires frequent fire to keep scrubby vegetation to a minimum. Wildfires may achieve this purpose, but with every wildfire, there is the potential for the alteration of the hydrology of salamander habitat from fire suppression activities. The 7SFG(A) and JSF will work with the NRS to develop a Wildfire Operational Plan to identify high wildfire risk conditions and notification procedures for units to follow to engage fire response personnel when needed. Munitions and pyrotechnics use will follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006a).

With proper avoidance and minimization measures in place (see Table 4-9), the Proposed Action is not likely to adversely affect the flatwoods salamander.

4.1.5 Piping Plover

Federally threatened piping plovers have only been documented using critical habitat areas on the north shore of SRI and one area on the eastern portion of Eglin SRI property just west of TA A-3 (Gault, 2006a). However, research indicates that patterns of piping plover habitat usage can be very complex. Plovers could feasibly use several locations on the island for foraging, roosting, or sheltering at any time, day or night. Piping plovers are known to forage in exposed wet sand areas such as wash zones, intertidal ocean beachfronts, wrack lines, washover passes, mud and sand flats, ephemeral ponds, and salt marshes. They are also known to use adjacent areas for sheltering in dunes, debris, and sparse vegetation. All of these habitat types can be found on Eglin's portion of SRI. Although it is possible that piping plovers could use any one of these habitat types at any time during the wintering season, studies have shown that wintering plovers spend 76 percent of their time foraging for invertebrates found just below the surface of wet sand (Johnson and Baldassarre, 1988). Therefore, during the wintering season (15 July to 15 May), the 7SFG(A) is more likely to encounter piping plovers in shoreline areas than in inland movement corridors.

If the Proposed Action takes place during the piping plover wintering season, it is possible that piping plovers may be present in the action area. In the unlikely event that a piping plover is found in or near the mission area, human presence and associated noise may flush the bird from the landing area, possibly causing stress and extra caloric expenditure. Displaced plovers may simply move on to undisturbed foraging areas nearby. 7SFG(A) activities on SRI would be of a transient nature, and any disturbances would be of short duration.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-5

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-155

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Thus, the 7SFG(A) operations are not likely to adversely affect the wintering piping plover population. 7SFG(A) activities that take place outside the plover wintering period will have no effect on wintering piping plover populations.

4.1.6 Piping Plover Critical Habitat

Within property administered by Eglin AFB, critical habitat is situated on the north shore of SRI approximately 3 miles west of TS A-15 (Figure 3-9). The critical habitat area is posted with endangered species signs and admittance is not allowed. Activities associated with the 7SFG(A) mission will not occur in piping plover critical habitat.

As a result, 7SFG(A) operations will have no effect on designated piping plover critical habitat on SRI.

4.1.7 Red-cockaded Woodpecker

The Proposed Action may result in impacts from direct encounters, noise, human presence, and habitat alteration. The following sections analyze each of these impacts, and provide avoidance and minimization measures to reduce or remove impacts.

Direct Physical Impacts

The potential exists for an RCW cavity tree to be hit by munitions used during 7SFG(A) activities on the SOF ranges, JSF strafing at TA B-75 and TA C-62, and JSF bombing at TA B-82 and TA C-52E. No RCW trees are within the impact zones for JSF munitions, thus there is limited potential for direct physical impacts to active cavity trees at any of the four test areas. Where there is a high risk of projectile damage to foraging or nesting habitat, the 2006 Army guidelines state that, when practical and economically feasible, range layout should be modified/shielded to protect RCW foraging and nesting habitat (U.S. Army, 2006). Additionally, in RCW foraging habitat in surface danger zones that are not frequently impacted by weapons firing, RCW management may be conducted the same as for foraging habitat outside of impact areas.

Pyrotechnics and munitions have the potential to impact RCW health if ingested or accumulated in soils and water. Potential effects on RCWs from the use of flares are inhalation of flare ash and ingestion of or contact with the chemical constituents of flares. The toxic effects of flare ash residue were tested on mammals, plants, and fish with concentrations of flare ash representing the high range that would be found in a pyrotechnic test area. Results indicated that the effects of flare ash residue are very minimal and not particularly dangerous to the environment (U.S. Air Force, 1997). The resultant addition of chemical constituents of flares is not of sufficient quantities to change soil, water, or air chemistry.

RCWs could be potentially exposed to dye-colored smoke through inhalation, ingestion, direct contact, or bioconcentration. The most likely opportunity for such exposure will

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-6

H-156

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

be immediately after the smoke has been dispelled, but since RCWS will most likely leave the area during training exercises, the likelihood of direct exposure to toxic levels of emissions will be low. Ingestion or inhalation of particles in sufficient amounts to cause harm is unlikely because of the wind-driven distribution of smoke particles.

The 7SFG(A) and JSF will follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army, 2006), the restrictions in Table 4-1, and the avoidance and minimization measures in Table 4-9 to reduce the potential for direct physical impacts to the RCW.

Table 4-1. Training Activities Within the RCW Buffer Zone

TRAINING ACTIVITY WITHIN BUFFER ZONES (1)	
MANEUVER AND BIVOUAC:	ALLOWED
Hasty defense, light infantry, hands and hand tool digging only, no deeper than 2 feet, 2 hours MAX	Yes
Hasty defense, mechanized infantry/armor	No
Deliberate defense, light infantry	No
Deliberate Defense, mechanized infantry/armor	No
Establish command post, light infantry	No
Establish command post, mechanized infantry/armor	No
Assembly area operations, light infantry/mech infantry/armor	No
Establish CS/CSS sites	No
Establish signal sites	No
Foot transit thru the cluster	Yes
Wheeled vehicle transit thru the cluster (2)	Yes
Armored vehicle transit thru the cluster (2)	Yes
Cutting natural camouflage, hardwood only	Yes
Establish camouflage netting	No
Vehicle maintenance for no more than 2 hours	Yes
WEAPONS FIRING	
7.62mm and below blank firing	Yes
.50 cal blank firing	Yes
Artillery firing point/position	No
MLRS firing position	No
All others	No
NOISE:	
Generators	No
Artillery/hand grenade simulators	Yes
Hoffman type devices	Yes
PYROTECHNICS/SMOKE	
CS/riot agents	No
Smoke, haze operations only, generators or pots, fog oil and/or graphite flakes (3)	Yes
Smoke grenades	Yes
Incendiary devices to include trip flares	Yes
Star clusters/parachute flares	Yes
HC smoke of any type	No

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-7

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-157

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-1. Training Activities Within the RCW Buffer Zone, Cont'd

DIGGING	ALLOWED
Tank ditches	No
Deliberate individual fighting positions	No
Crew-served weapons fighting positions	No
Vehicle fighting positions	No
Other survivability/force protection positions	No
Vehicle survivability positions	No
NOTES:	
(1) These training restrictions apply to RCW cavity trees in training areas but not to cavity trees located in dedicated impact areas.	
(2) Vehicles will not get any closer than 50 feet of a marked cavity tree unless on existing roads, trails or firebreaks.	
(3) Smoke generators and smoke pots will not be set up within 200 feet of a marked cavity tree, but the smoke may drift thru the 200 foot circle around a cavity tree.	

Source: U.S. Army, 2006

Noise and Human Presence

RCWs may be affected by noise and human presence associated with 7SFG(A) cantonment and range operations and JSF range operations. Indirect impacts to RCWs could occur from the physical presence of personnel or equipment within foraging habitat, or from noise associated with munitions, vehicle, or aircraft use. Impacts could include changes in nesting behavior and feeding.

Ground Operations

Certain training activities (e.g., refueling points, generators, smoke generators, smoke pots, and mechanical digging) are by their nature likely to disrupt the ability of RCWs to roost or nest (or conduct nesting activities such as incubating, brooding, feeding) if conducted in proximity to cavity trees (U.S. Army, 2006). Vehicle movements and other training activities near RCW clusters will potentially create noise and disturbance that could affect the RCW. Depending on the type of vehicle, noise levels can be quite loud and accompanied by heavy vibration. Delaney et al. (2002) monitored nesting RCWs as a convoy of vehicles passed (Table 4-2). Birds did flush as a result of the passing of the convoy but returned shortly thereafter. Vehicle use associated with 7SFG(A) training along existing roadways does not represent a novel noise and disturbance source such that RCWs would abandon the area. Birds near these areas are likely acclimated to the presence of vehicles.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-8

H-158

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-2. Red-cockaded Woodpecker Response to Vehicle Noise and Disturbance

Noise Source	Noise Level (SEL)	Distance (m)	Notes
Vehicles (convoy of Bradley Fighting Vehicles and civilian vehicle)	<75	>50	Bird returned after 10 minutes after convoy had passed. Birds returned after 3 minutes when civilian vehicle had passed.

m = meters; SEL = sound exposure level

Annual updates of *Eglin's Threatened and Endangered Species Component Plan* identify the current number of clusters subject to training restrictions. The NRS will coordinate with the 46 TW and USFWS to determine locations of protected clusters based on biologically sound principles to reduce risk of disturbance, demographic isolation, and habitat fragmentation, while minimizing effects on training operations. Protected clusters subject to training restrictions include active clusters (captured clusters, solitary birds, and PBGs) and currently inactive recruitment clusters in areas of the Eglin reservation where training will occur. All current and future recruitment clusters with the "supplemental" designation are exempt from training restrictions regardless of population status (U.S. Air Force, 2006).

For protected clusters in areas of the Eglin reservation where training will occur, buffers for all suitable cavity or cavity start trees will be marked. RCW trees will be marked prior to any field maneuvering training by the 7SFG(A). Warning signs will be posted and will be constructed of durable material, ten inches square (oriented as a diamond), white or yellow in color. The RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 3/8-inch in height. Warning signs will be posted at reasonable intervals along the 200-foot perimeter of cavity trees facing to the outside of the buffer zone and along roads, maintained trails and firebreaks, and other likely entry points into the buffer zone.

Eglin follows the *Management Guidelines for the Red-Cockaded Woodpecker on Army Installations* which details activities that are allowed and those that are restricted near active RCW trees (U.S. Army, 2006). Military training within 200 feet of marked cavity trees is limited to military activities of a transient nature (less than two hours occupation), and military vehicles are prohibited from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road or maintained trail or firebreak. Prohibited activities within the 200-foot buffer include bivouacking, excavating, digging, and establishing command posts (Table 4-1).

Construction and Daily Operations

Land clearing, large machinery operation, and construction may disturb individuals or populations. Foraging RCWs may avoid areas where construction is occurring.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-9

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-159

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Pioneering RCWs may be affected by noise from daily operations and not colonize or immigrate to new areas near the cantonment site. This could affect the growth of the RCW population around the proposed cantonment area. Loud noises during nesting season (April – July) may affect RCW reproduction. Certain range roads in proximity to RCW foraging habitat would have an increased amount of traffic both during construction and daily operations, potentially creating noise levels that would affect RCWs.

Suitable habitat appears to outweigh any negative influences associated with noise due to construction or military bombing. Observations have indicated that many animals become adapted to human activities and noises (Busnel, 1978). Scientists who have researched the effects of noise on wildlife report that animals may initially react with a startle effect from noises, but adapt over time, so that even this behavior is eradicated (Busnel, 1978). Based on the fact that the RCW population continues to grow at Eglin, including areas in close proximity to test areas, it appears that they have adapted to all of the noises associated with the military mission, including supersonic booms. Noise from construction and general operations would be much less impactful.

Munitions Use

Munitions noise may also affect the RCW through changes in nesting behavior and feeding. In a study at Fort Stewart, RCWs did not flush (i.e., take flight) when the distance of small arms fire was greater than 152.4 meters and the noise level was less than 80 decibels (dB) (Table 4-3). The distance between a 75FG(A) range and the closest active RCW tree is over 400 meters. Overall, Delaney et al. (2002) found that military training exercises of short duration (less than two hours) conducted near active RCW cavity trees did not significantly affect the ability of the individuals to successfully reproduce. Activity longer than two hours was not tested.

Table 4-3. 75FG(A) Range - Red-cockaded Woodpecker Response to Small Arms Noise

Noise Source	Noise Level (SEL)	Distance (m)	Notes
Small Arms (.50-cal blank)	<80	>152.4	Birds returned to nest an average of 6.3 minutes after noise ceased. Longest flush time was 26.8 minutes.

Source: Delaney et al., 2002

cal = caliber; m = meters; SEL = sound exposure level

Ordnance noise is categorized as high-explosive impulse noise, such as occurs from live bombs or artillery. This type of noise is accompanied by abrupt increases in pressure and powerful, low frequency sound that rapidly spreads from the point of detonation. The sound and pressure of a detonation can temporarily or permanently affect hearing, injure or kill an animal depending on the proximity of the animal to the source. Inert

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-10

H-160

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

and live bombs (GBU-12) will be dropped by the JSF on existing targets on TA B-82 and TA C-52E (Figure 3-4). Potentially harmful levels of noise could extend outward to active cavity trees. Although brief, exposure to this noise carries a risk of acoustic discomfort.

The RCW is nesting successfully in close proximity to TA B-82 and on TA C-52E, where munitions use already occurs. Similar exposures are likely occurring on occasion throughout these test areas and other test areas on the reservation with no known detrimental impacts on the overall population. Eglin NRS personnel have observed no difference in RCW productivity or survival from those clusters located near an active range or those far away. Compared to noise, habitat quality seems to be more influential in determining RCW productivity, survival and population stability (U.S. Air Force, 2007).

RCWs continue to thrive in noisy test areas and exist near TA B-70 in areas exposed to noise from sonic booms. Still, the potential for noise impacts to RCWs exists and could result in non-lethal harassment. RCWs will be most sensitive during nesting season (01 April to 01 July); noise could directly affect eggs and could cause nest abandonment by adults.

Noise impacts from large-caliber weapons (20-mm and above) have been studied at Fort Stewart, Georgia. Delaney et al. (2002) noted that RCWs did not leave their nests when large-caliber weapons noise was greater than 700 meters away (Table 4-4). Observations closer than 500 meters were not made. The noise level was measured at 102 dB (unweighted sound exposure level [SEL]). The closest targets to active RCW trees on TA C-62 and TA B-75 are 1,200 and 1,000 meters away, respectively (Figure 3-5).

Table 4-4. Red-cockaded Woodpecker Response to Large Caliber Weapon Noise

Noise Source	Noise Level (SEL)	Distance (m)	Criteria	Effects	Notes
20 mm	<102	>700	No flush response	Animals did not flush at these levels. Nesting and reproduction were not significantly affected.	Unable to test at < 500 m

Source: Delaney et al., 2002

m = meters; mm = millimeters; SEL = sound exposure level in unweighted decibels

Road Improvements

A small number of road improvements such as asphalt or widening are planned to provide proper access to the 7SFG(A) cantonment area and ranges (Figure 3-6). Noise from road improvements may affect RCWs. As discussed previously, compared to noise, habitat quality seems to be more influential in determining RCW productivity,

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-11

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-161

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

survival and population stability (U.S. Air Force, 2007). Temporary noise from road improvements will not impact RCWs provided the road workers follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army, 2006), the restrictions in Table 4-1, and the avoidance and minimization measures in Table 4-9 to reduce the potential for noise impacts to the RCW.

Air Operations

Aircraft noise from JSF training has the potential to affect the RCW. Most commonly, the reaction of birds to aircraft noise, particularly when the aircraft is visible to the animal, is some degree of startle response, one response being flushing (i.e., abruptly leaving a nest) (Gladwin et al., 1988). In this case, a bird could theoretically leave its nest open to predation, thereby affecting reproductive success (Larkin, 1996).

Low-level flights over RCWs would expose the birds to high SEL levels (Table 4-5). The noise and visual presence associated with these low-level flights have the potential to impact RCWs, particularly during nesting season (April to June) when birds may be flushed from their nests, possibly affecting reproductive success. However, brooding birds are less likely to respond to noise with a flight response than roosting birds, and the average time away from the nest after a noise-induced flight was less than five minutes (Bowles et al., 1995).

Delaney et al. (2002) measured responses of the RCW to low-level aircraft noise at Fort Stewart. Researchers did not see a flight response when helicopters were greater than 30 meters from nests and the noise level was less than 102 SEL. Fixed-wing aircraft did not elicit a flushing response when located further than 600 meters (0.38 mile) away with noise levels less than 90 SEL. However, the study did not test for RCW response at distances less than 600 meters or at noise levels greater than 90 SEL, so it is possible that RCWs could tolerate louder, closer noises. The 600-meter, 90-SEL measurement should not be viewed as an absolute threshold, only as an example of conditions during which the RCW did not flush.

At the airfields where takeoffs and landings would occur, the nearest RCW foraging habitat is approximately 1,610 meters (1 mile) from Duke Field, 9,660 meters (6 miles) from Choctaw Field, and 4,830 meters (3 miles) from Eglin Main Base. On the Eglin Range, RCWs southeast of Duke Field may be exposed to high SEL levels during JSF takeoffs, landings, and touch and go-type operations. Due to the orientation of flight paths, no RCWs should be affected by F-35 flights in the Choctaw Field and Eglin Main Base areas.

Known RCW clusters are present in the areas under the MTRs VR-1082 and VR-1085, with a concentration of RCWs in Conecuh National Forest in south Alabama, and in the northeast portion of Eglin Range. It is unknown if and where RCWs may be located on

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-12

H-162

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

private lands in the area. F-35 aircraft would fly as low as 500 AGL along certain segments of VR-1082 and VR-1085, generating SEL of 129 dB (Figure 2-1). Currently, these routes are flown at the same altitudes. However, the loudest aircraft that uses the routes frequently is the F-15, which generates an SEL of 112 dB at 500 AGL (Table 4-5).

As with MTRs VR-1082 and VR-1085, the presence and location of RCWs on private lands under the Tyndall MOA are not known; however, known RCW clusters do exist on Apalachicola National Forest lands. Any RCWs present under the Tyndall MOA flight paths may be exposed to sound exposure levels up to 133 dB from F-35 flights at 300 feet AGL. The loudest overflight event currently occurring regularly under Tyndall MOAs is 116 dB SEL at 300 feet AGL, as generated by F-15 aircraft.

Restricted airspace at Eglin Range areas (R-2914 A/B, R-2915 A/B/C, and R-2919 A/B) allows military flights to ground level. However, JSF aircraft in these areas are not expected to fly at altitudes lower than 500 AGL and would generate noise levels similar to those generated on the lowest segments of VR-1082 and VR-1085. Currently, the F-15 aircraft flies as low as 500 AGL; and C-130, V-22 and various types of helicopters fly at altitudes less than 500 AGL in these areas.

JSF aircraft are expected to fly at high altitudes (greater than 10,000 AGL) within Eglin A/B/C MOAs, and overflight noise events will generate noise at less than 87 dB SEL.

Table 4-5. Representative A-Weighted SEL in Decibels under the Flight Track for the Aircraft at Various Altitudes in a Military Operating Area

Aircraft Type	Airspeed	Power Setting ²	Altitude in Feet Above Ground Level ¹						
			300	500	1,000	2,000	5,000	10,000	20,000
F-15C	520	81% NC	116	112	107	101	90	80	65
F-35	500	Est% ETR*	133	129	121	112	99	87	74
F-16C	450	87% NC	109	105	100	94	84	76	65
F-18E/F	360	83% N2	113	110	104	97	86	76	65
C-130H	170	970 CTIT	100	97	91	86	77	70	61
H-60	140	LFO load	95	92	87	82	73	65	56

⁽¹⁾ Level flight, steady high-speed conditions. Used standard acoustical conditions (70°F and 59% relative humidity).

⁽²⁾ Power setting metrics vary from engine to engine; ETR = engine throttle ratio; F-16 engine is PW-229; RPM = revolutions per minute; %NC = percent core RPM; %N2 = percent RPM at engine location #2; CTIT = Centigrade Turbine Inlet Temperature; LFO load = Liftoff Loaded 140 Knots Indicated Air Speed; SEL = Sound Exposure Level

Birds that live near airfields and under established flight paths are likely accustomed to the types of noise disturbance produced by aircraft, and in some cases it appears that the presence of suitable habitat outweighs the disturbance of loud noises (U.S. Air Force, 2007). While introduction of the F-35 will increase the noise and activity levels at the airfields and along existing flight paths, increases will be gradual, allowing birds to

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-13

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-163

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

acclimate to the noise. RCWs may exhibit a temporary flight response initially until they become accustomed to the increased noise levels.

The 7SFG(A) and JSF will follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army, 2006), the restrictions in Table 4-1, and the avoidance and minimization measures in Table 4-9 to reduce the potential for noise impacts to the RCW.

Habitat Impacts

An independent Oracle-based GIS tool (model) has been developed as a foraging habitat assessment tool for Eglin to consistently and accurately estimate the available foraging resources without sampling the entire Reservation (U.S. Air Force, 2006). The USFWS completed ESA Section 7 consultation on the model in June 2003, and concurred with Eglin NRS findings of Not Likely to Adversely Affect. Recent research has demonstrated that foraging analyses such as Eglin's model accurately portray the actual territories of RCW groups (Convery and Walters, 2004).

Eglin NRS has consulted with the USFWS on the guidelines for the habitat conditions and foraging requirements for RCWs on Eglin. Eglin NRS personnel use the guidelines identified in the *Threatened and Endangered Species Component Plan* (U.S. Air Force, 2006) when determining whether consultation with the USFWS is required. Table 4-6 is a comparison of the current Recovery Plan foraging standards and Eglin specific standards.

Table 4-6. Foraging Habitat Variable Standards for Red-cockaded Woodpeckers

Measure	USFWS Recovery Standard	USFWS Managed Stability Standard	Eglin Recovery Standard	Eglin Managed Stability Standard
Acres	200-300	75	300	150
Density (stems per acre)	18 > 14 in dbh	None	20 > 10 in dbh	None
Density total (stems per foraging area)	None	None	6,000 > 10 in dbh	3,000 > 10 in dbh
Basal Area (ft ² per acre)	20 > 14 in dbh	40-70 > 10 in dbh	20 > 10 in dbh	None
Basal Area total (ft ²)	None	3,000 > 10 in dbh	6,000 > 10 in dbh	4,000 > 10 in dbh
Distance from cluster	0.5 mile	0.25 mile	0.5 mile	0.3 mile
Midstory height	7 ft	7 ft	7 ft	7 ft
Ground cover	>40% herb	None	> 40% herb	None

> = greater than; < = less than; dbh = diameter at breast height; ft² = square feet; in = inch

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-14

H-164

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

The first column contains the values defined in the Recovery Plan as the Recovery Standard for public lands. The second column contains the values defined in the Recovery Plan as the Managed Stability Standard for private lands in order to protect existing groups (USFWS, 2003). The last two columns are recommendations for Eglin's Recovery Standard and Managed Stability Standard. A No Effect determination would be made if a cluster's foraging resources exceed Eglin's Recovery Standard after the completion of a proposed action. A Not Likely to Adversely Affect determination would be made if a cluster's foraging resources fall between Eglin's Recovery Standard and Eglin's Managed Stability Standard after the completion of a proposed action. A Likely to Adversely Affect determination would be made if a cluster's foraging resources fall below Eglin's Managed Stability Standard after the completion of a proposed action. Also, if the proposed action affects less than one percent of the foraging resources, and the foraging resources are above Eglin's Managed Stability Standard, then no consultation would be required.

The Proposed Action may impact RCW habitat from tree clearing, road improvements, fire suppression, and wildfire.

Land Clearing

Land clearing activities within RCW foraging habitat at the proposed 7SFG(A) cantonment area and 7SFG(A) Group 1 ranges will result in the loss of RCW foraging habitat (Figure 3-6).

7SFG(A) Group 1 Ranges within RCW foraging habitat: Based on the calculations of the Eglin RCW model and the location of the proposed 7SFG(A) Group 1 ranges in reference to RCW foraging habitat, the habitat loss to RCW cluster 102F from the tree clearing will be 10.2 acres; of the 10.2 acres, only 2.9 acres are optimal habitat (NRS GIS, 2007). Two acres of foraging habitat (all of it optimal) will be removed from cluster 101B, but the proposed 7SFG(A) range activities will still leave 582 acres of foraging habitat which is above the managed stability standard and the recovery standard (NRS GIS, 2007; U.S. Air Force, 2006). Therefore, even with 12.2 acres removed from both clusters, only a small amount (2.9 acres from cluster 102F and 2 acres from cluster 101B) is optimal habitat (Table 4-7).

Table 4-7. 7SFG(A) Cantonment and Group 1 Ranges: Acres of RCW Foraging Habitat Cleared

Location	Cluster	Foraging Habitat Cleared (Acres)	Optimal Habitat Cleared (Acres)	Foraging Habitat Remaining (Acres)
7SFG(A) Group 1 Ranges	102F	10.2	2.9	502.8
	101B	2	2	582
7SFG(A) Cantonment	103L	173	47	255

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-15

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-165

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

7SFG(A) Cantonment Area within RCW foraging habitat: Based on calculations from the Eglin model and the location of the proposed 7SFG(A) cantonment area in reference to foraging habitat, the habitat loss to cluster 103L from the tree clearing will be up to 173 acres (Table 4-7). Of the 173 acres, 47 acres are optimal habitat (NRS GIS, 2007). Even though 27 percent of the acres to be removed from cluster 103L are optimal habitat, the proposed 7SFG(A) cantonment area will still leave 255 acres of foraging habitat, which is above the managed stability standard (NRS GIS, 2007; U.S. Air Force, 2006). Land clearing for the cantonment area may require the cutting of up to nine inactive cavity trees. If tree clearing is to occur during nesting season, Eglin will screen each inactive cavity tree during the breeding season to verify no trees have been recolonized and to prevent use by other bird species protected by the Migratory Bird Treaty Act. Final site plans will not require all of the trees in the 173 acres of foraging habitat to be removed, thus impacts will be less than analyzed in this BA.

7SFG(A) Group 2 Ranges. Establishment of the 7SFG(A) Group 2 ranges will require a maximum of three inactive RCW trees to be cut near TA C-52W. None of the three inactive cavity trees belongs to an active cluster. The NRS last visited these three trees in 2000 and the cavities were either not completed or unusable by RCWs (Gault, 2006b). NRS biologists indicate there is no chance for any of these inactive trees to become active (Gault, 2006b). This area is not significant or of importance in future RCW management or emphasis areas as designated by the *Eglin Integrated Natural Resources Management Plan* (U.S. Air Force, 2007). No good foraging habitat is available near the trees, with most of the surrounding habitat consisting of sand pine. Additionally, the closest active clusters are over six miles away, and RCWs do not fly this great a distance, particularly with no foraging habitat available; thus, it is extremely unlikely that these nesting cavities would ever be completed by RCWs. RCWs have not occupied these inactive RCW cavity trees for over 12 years and the condition of the trees indicates no chance for re-occupation; no impacts to RCWs will occur due to the removal of two or three inactive trees near TA C-52 (Gault, 2006b).

JSF MSA. Sixteen inactive cavity trees for the federally endangered RCW are located within the MSA that the JSF Program will utilize. Eglin NRS biologists indicate there is no chance for this cluster to become active because the habitat is not suitable for future colonization (Gault, 2006b). No good foraging habitat is available near the trees, with most of the surrounding habitat consisting of sand pine. Additionally, the closest active clusters are over five miles away, and RCWs do not fly this great a distance, particularly with no foraging habitat available. This area is not significant or of importance in future RCW management or as an emphasis area as designated by the *Eglin Integrated Natural Resources Management Plan* (U.S. Air Force, 2007). Furthermore, a letter from the USFWS on 05 June 1997, concurs with Eglin NRS that any future developments

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-16

H-166

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

impacting RCW inactive trees on Eglin Main Base are not likely to adversely affect the RCW (USFWS, 1997).

Road Improvements

A small number of road improvements such as asphalt or widening are planned to provide proper access to the 7SFG(A) cantonment area and ranges (Figure 3-6). Road improvements have the potential to remove foraging habitat. Eglin NRS personnel use the guidelines identified in the *Threatened and Endangered Species Component Plan* (U.S. Air Force, 2006) when determining whether consultation with the USFWS is required. Only one large road improvement has been identified. Asphalt and widening of RRs 608, 237, 213, and 215 just west and south of the proposed 7SFG(A) cantonment area have been proposed but detailed plans have not been released (Figure 3-6).

Land clearing for the road improvements may require the cutting of up to six inactive cavity trees, through cluster 107J, two inactive cavity trees north of the proposed cantonment area on the corner of RR237 and RR608, one inactive cavity tree on RR608, and four artificial cavity trees (Figure 3-6). The inactive trees within foraging habitat 107J and located just west of Hwy 85 have been active within the last ten years. The artificial cavity trees are a recruitment cluster that Eglin Natural Resources planned on growing. The likelihood that this recruitment cluster will become active over the next year or two is high. Eglin's rate of recruitment clusters becoming active is approximately 75 percent. Road improvements through the middle of the recruitment cluster will negatively affect the potential for this recruitment cluster to become active. If tree clearing is to occur during nesting season, Eglin will screen each inactive cavity tree during the breeding season to verify no trees have been recolonized and to prevent use by other bird species protected by the Migratory Bird Treaty Act.

Only a small portion of foraging habitat may be lost to each cluster (Table 4-8), and the closest active RCW tree is located over 200 meters from the proposed road improvements. The preliminary location of the entry control point is over 150 meters from the closest active RCW tree. All criteria will be above the recovery standards set for the Eglin RCW population (U.S. Air Force, 2006). Given the cumulative impacts of habitat loss, proposed road improvements have been included to provide an overall potential impact scenario.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-17

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-167

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-8. 7SFG(A) Road Improvements: Acres of RCW Foraging Habitat Cleared

Location	Cluster	Foraging Habitat Cleared (Acres)	Foraging Habitat Remaining (Acres)
East of Cantonment on RR 215	107J	15.5 (includes 2.5 acres from preliminary access control point)	374
	104S	49.5 acres (includes 42 acres from access control point)	506.5
	104O	5	249
	104T	8.5	303
West of Cantonment on RR 608	102D	10	616
	102F	10	495

Note: Optimal Habitat Cleared has not been included due to inaccuracy in model and small amount of foraging habitat affected due to road improvements.

Wildfires

Munitions use at the 7SFG(A) SOF ranges, JSF strafing at TA B-75 and TA C-62, JSF bombing at TA B-82 and TA C-52E, and flare use at various locations over the Eglin Range will increase the number of wildfires (Figure 3-4 to Figure 3-6, and Figure 3-8). Additionally, increases in mission activity at the ranges will make it more difficult to conduct prescribed fires, resulting in a likely increase in the number and intensity of wildfires. Wildfires can be both beneficial and harmful to native species and habitats. Fires under the proper conditions have a beneficial effect on RCW habitat by maintaining good quality understory conditions. However, wildfires may result in negative impacts to RCW habitat and RCW cavity trees in areas that have not been burned within the last few years or if fires occur under dry conditions. Such conditions result in "hot" fires that could damage normally fire-resistant longleaf pines, and could result in the destruction of RCW cavity trees. The test areas where JSF live munitions use will occur have been used for years as bombing and strafing ranges. These test areas have regular mission-related fires which keep fuel levels low and hot fires to a minimum. These test areas have good RCW habitat around them, as demonstrated by the number of RCW clusters in the surrounding areas.

The 7SFG(A) and JSF will work with the NRS to develop Wildfire Operational Plans to identify high wildfire risk conditions and notification procedures that units will follow to engage fire response personnel when needed. Munitions and pyrotechnics use will follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006a) which rate fire danger from low to extreme. During days with low fire danger, there are no restrictions on missions, but on days with extreme fire danger, no pyrotechnics are allowed without prior approval from the Wildland Fire Program Manager at the Eglin NRS. These restrictions during extreme fire danger will reduce the likelihood of a mission-induced wildfire. Avoidance and minimization measures in Table 4-9 will

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-18

H-168

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

reduce the potential for impacts to RCWs; however, even with implementation of the measures in Table 4-9, additional wildland fire positions will be needed to respond to the increased number of wildfires.

Fire Suppression

As stated previously, increased mission activity at TA B-75, TA C-62, TA B-82, and TA C-52E will limit the ability of the NRS to conduct prescribed burns. In addition, development of the 7SFG(A) cantonment area and Group 1 ranges in the middle of a fire-dependent sandhills habitat will limit the ability of the NRS to conduct prescribed burns in the area (Furman, 2007) (Figure 3-6). While wildfires may sometimes provide beneficial results in fire-adapted habitats, they just as easily can cause damage if they burn too hot; thus, prescribed fire is the preferred method for managing RCW foraging habitat in sandhills. Eglin NRS will not be able to burn the area as frequently or as well due to smoke management problems with the cantonment area and ranges. The Eglin NRS will prioritize prescribed fire as resources allow, however, the quality of the RCW foraging habitat around the 7SFG(A) cantonment area and Group 1 ranges would likely degrade if there is fire suppression and no alternative means (herbicides or mechanical) to control midstory vegetation. A decrease in the frequency of prescribed fires (to reduce fuel loads) may also lead to an increase in the number and severity of wildfires surrounding the ranges, which have the potential to damage RCW cavity trees.

Although the proposed action may limit the ability of the NRS to conduct prescribed burns in the area, through coordination with 7SFG(A) and mission personnel, it may be possible to conduct enough burns in the area to continue RCW habitat maintenance (Hagedorn, 2007). Additional manpower would be required to burn these areas and to coordinate with 7SFG(A) personnel at the cantonment area and ranges. Alternate means of controlling undergrowth are also available and could be used here. These methods include using specific herbicides that target understory or midstory vegetation and mechanical means. RCWs will be impacted due to fire suppression and associated degradation of the habitat over time.

Population Impacts

If the 7SFG(A) uses Group 1 ranges daily, as proposed in Chapter 2, then the Eglin NRS will lose access to that area for monitoring and will have to drop 11 clusters from Eglin's donor area. This will lower Eglin's ability to translocate birds to the eastern subpopulation or to other partners in the Southern Range Translocation Cooperative. Also, Eglin will lose about six potential recruitment cluster sites, which may in the short term affect Eglin's ability to reach recovery since this area already has suitable habitat and other areas will need to wait for habitat management.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-19

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-169

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Habitat Management

Eglin will continue to implement guidelines for habitats throughout the reservation to maintain and improve potentially suitable habitat for the RCW. Guidelines prohibit the cutting of pine trees unless previously approved by NRS biologists. Units will be instructed to immediately report to range control known damage to any marked cavity or cavity start tree and/or any known extensive soil disturbance in and around RCW clusters; range control will notify NRS biologists immediately. Within three working days of notification, the Eglin NRS will reprovise a cavity tree if one is destroyed due to training activity. If a unit causes damage to training land within a cluster, the responsible unit will coordinate with the NRS to repair damage as soon as practicable (normally within three working days of notification). All digging for military training activities in RCW habitat management units will be filled and inspected upon completion of training. Training guidelines will be actively enforced through training and natural resources enforcement programs, prescribed in chapters 1 and 11 of Army Regulation 200-3 (U.S. Army, 1995), and installation range regulations. Based on the new Army training guidelines (2006), Eglin would currently qualify for up to 126 exemptions (or clusters) from training restrictions. The specific exemptions would be identified at a later date after locations of all Army and Air Force training units have been finalized.

Summary

The Proposed Action has the potential to impact the RCW from direct physical impacts, noise and human presence (ground operations, munitions use, and air operations), and habitat impacts (land clearing, fire suppression, road improvements, and wildfires). Cumulatively, these stressors have the potential to negatively affect certain RCW clusters, primarily in the 7SFG(A) cantonment and Group 1 range area, where RCWs will be subject to the combination of land clearing, fire suppression, wildfires, noise, and human presence. To minimize potential impacts, the 7SFG(A) and JSF will follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army, 2006), the restrictions in Table 4-1, and the avoidance and minimization measures in Table 4-9.

Eglin will implement Avoidance and Minimization Measures. However, JSF and 7SFG(A) activities may affect, and are likely to adversely affect, the RCW.

4.1.8 Eastern Indigo Snake

The primary potential impact to the federally threatened eastern indigo snake is from crushing by vehicles during construction, daily operations, and ground maneuvers. All gopher tortoise burrows at the JSF and 7SFG(A) construction sites will be inspected with a video camera to look for indigo snakes immediately prior to land disturbing and construction activities. It is highly unlikely that an indigo snake will be found; however, if located it will be left in place unless construction is imminent. In this case the NRS will relocate the snake.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-20

H-170

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Eglin is currently preparing a programmatic Section 7 ESA consultation with the USFWS to address the potential of finding an eastern indigo snake, relocating it to an appropriate area, and the assignment of take associated with such an action. This Section 7 consultation will be completed prior to any BRAC activity and will provide ESA compliance should an eastern indigo snake need to be relocated. The programmatic consultation will entail notification procedures and coordination with the NRS in the event an indigo snake is found.

Increased levels of heavy machinery and other vehicular traffic have the potential to impact indigo snakes and their habitat. However, the potential for encountering an indigo snake is very low; Eglin has not had any indigo snake sightings or reports since 1999. Incidental contact with personnel on foot and wheeled vehicles could result in trampling or crushing of individuals, but this occurrence is unlikely, as a snake would most likely move away from the area if it sensed a general disturbance in its vicinity. If an indigo snake is sighted, personnel will cease activities until the snake has moved away from the area.

Noise and chemicals associated with pyrotechnics and munitions use also may affect the indigo snake. Pyrotechnics have the potential to impact indigo snake health if ingested or inhaled; however, the resultant addition of chemical constituents of pyrotechnics is not of sufficient quantities to change soil, water, or air chemistry. The noise levels to which indigo snakes will be exposed from munitions use are unknown and cannot be predicted, but the lack of sightings of this species on Eglin in recent years (U.S. Air Force, 2007) suggests a low risk of impacts. Individuals that may be present will likely be associated with some type of burrow, which would provide some protection from loud noise.

As a result, the Eastern indigo snake is not likely to be adversely affected by 7SFG(A) and JSF activities.

4.1.9 Sea Turtles

7SFG(A) activities on SRI may cause direct and habitat impacts to sea turtles from boat landing and ground maneuvering activities. Movement of 7SFG(A) personnel will occur only on established roads and along or across pre-approved areas, and vehicles will not be driven on the beachfront during sea turtle season (01 May to 31 October), thus eliminating the potential for direct physical impacts from vehicles. There is a risk of direct physical impact to nesting females, hatchlings, and nests by direct strike of an animal by stepping on them during a mission. Additionally, even small troop movement such as the 7SFG(A) teams may obscure evidence of sea turtle crawls and nests.

Nesting females may be deterred from entering landing corridors during nighttime operations; however, due to the clandestine nature of the 7SFG(A) mission, very little disturbance will occur. Deterrence effects to nesting sea turtles from noise occurring in

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-21

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-171

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

the absence of visual disturbance is not well understood, and the amount and intensity of noise necessary to deter nesting females remains undocumented (Lutz et al., 2002). If noise levels sufficient to deter nesting emergences were to occur, this noise would have a localized effect on the beachfront.

The peak rate of nesting emergences per night per unit area of beach front was estimated to help determine how many nesting emergences, if any, may be deterred during the course of these activities (see Chapter 3). The peak rate of loggerhead turtle nesting emergences is 0.01 nests per night per half-mile, and the peak rate of green turtle nesting emergences is 0.004 nests per night per half-mile (Eglin Decision Support System, 2007). These low rates of nesting emergences during peak nesting season greatly reduce the probability that nesting sea turtles will be deterred by 7SFG(A) activities, which will have a duration of less than 5 minutes. This probability will be further reduced for exercises conducted outside of the peak nesting seasons for each species (June—loggerheads and July—green sea turtles).

Actively nesting females may be deterred from completing the egg-laying process if there was an encounter with the 7SFG(A) on the beach. This is highly unlikely given the low nesting activity. Even in the most active nesting months (June and July), the combined loggerhead and green turtle density is 0.011 turtles per night per half mile. The time the troops will be on the beach is less than five minutes. The probability that a nesting turtle and a mission will coincide is extremely low; however, the potential exists.

Based on the Terms and Conditions in the *SRI Mission Utilization Plan Biological Opinion* (USFWS, 2005), certain mission restrictions apply during sea turtle season to protect nesting and hatching sea turtles. The 7SFG(A) will coordinate any SRI activities with the NRS prior to beginning the activity. No beachfront activities will take place until after Eglin's NRS completes the morning sea turtle nesting surveys during sea turtle season. Eglin will instruct troops and personnel to avoid designated sea turtle nests by at least 50 feet, and to not interfere with nesting sea turtles, impede hatchling sea turtles from emerging from the nest and crawling to the Gulf of Mexico, or obscure signs of sea turtle activity. The 7SFG(A) will stage vehicles, helicopters, and watercraft at least 200 feet away from any nest past day 60 incubation. Eglin will instruct troops to avoid sand dunes greater than five feet high; the 7SFG(A), in coordination with the NRS, will restore any beach or dune habitats that are impaired by mission activities. Immediately following operation completion, the 7SFG(A) will refill all holes and remove all ruts deeper than two inches during August through October at nests at incubation day 60 or greater. Eglin AFB will distribute a handbook to mission participants that provides information about the coastal ecosystem and protected species, Eglin's policies related to natural resource protection, and the requirements to be implemented for the activities.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-22

H-172

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

As determined in the *SRI Mission Utilization Plan Biological Opinion* (USFWS, 2005), ground maneuvers on SRI are likely to adversely affect sea turtles during sea turtle season, but are not likely to adversely affect sea turtles outside of sea turtle season. Potential impacts associated with 7SFG(A) activities are covered under the *SRI Mission Utilization Plan Biological Opinion* (USFWS, 2005) mentioned above, and the Terms and Conditions from that Biological Opinion (BO) will be implemented as part of the 7SFG(A) action (Miller, 2007), along with the Avoidance and Minimization Measures in Table 4-9.

4.1.10 Perforate Lichen

There is one large population of the federally endangered perforate lichen on the eastern portion of Eglin's SRI property and two small reintroduction sites just east of TA A-10 on SRI (Figure 3-9). The 7SFG(A) activities may occur near the lichen reintroduction population; however, troop movements will be situated a safe distance away from lichen populations. The lichen sites are posted with endangered species signs and admittance is not allowed. 7SFG(A) activities will not occur in designated perforate lichen habitat.

Thus, 7SFG(A) operations will have no effect on populations of the perforate lichen on SRI.

4.1.11 Freshwater Mussels

Eglin has previously approved certain landing sites on the Yellow River through the *Estuarine and Riverine Programmatic Environmental Assessment* (U.S. Air Force, 2004) and the *Amphibious Readiness Group/Marine Expeditionary Unit Environmental Assessment* (U.S. Air Force, 2003). Landings will occur only at designated boat landing areas. As discussed in the *Estuarine and Riverine Programmatic Environmental Assessment* (U.S. Air Force, 2004), erosion could potentially occur at boat-landing sites from repeated use. Excess sedimentation could negatively impact federal candidate mussel species by interfering with feeding, reproduction, and respiration. To minimize erosion in heavily used shoreline areas, the 7SFG(A) will avoid contact with emergent vegetation along banks and shorelines, rotate use of boat landing sites, and initiate restoration/stabilization efforts if necessary. Due to their shallow draft, Zodiac boats will cause very little disruption to river bottoms, including mussel habitat, and have little possibility of direct physical impacts to mussel species.

Thus, 7SFG(A) water operations are not likely to adversely affect candidate mussel species.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-23

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-173

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

4.1.12 Avoidance and Minimization Measures

The JSF, 7SFG(A), Eglin NRS, and Eglin AFB will implement the Avoidance and Minimization Measures below to reduce or remove impacts to biological resources from JSF and 7SFG(A) cantonment and range activities (Table 4-9).

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/ILZs	7SFG(A) SKI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Red-cockaded Woodpecker	Continue monitoring of RCWs in the area by the Eglin NRS. Follow the <i>Management Guidelines for the Red-Cockaded Woodpecker on Army Installations</i> , which details activities that are allowed and those that are restricted near active RCW trees (U.S. Army, 2006) (Table 4-1). Within 200 feet of marked cavity trees	✓			✓	✓		✓	✓	✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-24

H-174

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	allow only military activities of a transient nature (less than two hours occupation). Within the 200 foot buffer, prohibit bivouacking, excavating, digging, and establishing command posts.	✓			✓	✓				
	Prohibit military vehicles from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road or maintained trail or firebreak.	✓			✓	✓				
	For protected clusters in areas of the Eglin reservation where	✓			✓	✓				

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-25

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-175

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	ground training will occur, mark buffers for all suitable cavity and cavity start trees prior to mission initiation. Warning signs will be posted at reasonable intervals along the 200-foot perimeter of cavity trees facing to the outside of the buffer zone and along roads, maintained trails and firebreaks, and other likely entry points into the buffer zone. Do not allow longleaf pine trees larger than 5 feet in height to be cut or destroyed, unless written permission									

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-26

H-176

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

1

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&F Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF JITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	has been granted by the NRS.									
	Immediately report to range control to known damage to any marked cavity or cavity start tree and/or any known extensive soil disturbance in and around RCW clusters; range control will notify NRS biologists immediately.	✓			✓					
	Within 3 working days of notification, the Eglin NRS will re-provision a cavity tree if one is destroyed due to training activity.	✓			✓					
	If a unit causes damage to training land within a cluster, the	✓			✓					

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-27

January 2008

Final Formal ESA Section Seven Consultation for 2005 BRAC Decisions and Related Actions at Eglin Air Force Base, Florida

4-27

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-177

2

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	responsible unit will coordinate with the NRS to repair damage as soon as practicable (normally within 3 working days of notification).									
	All digging for military training activities in RCW habitat management units will be filled and inspected upon completion of training.	✓			✓					
	Continue prescribed burning as much as possible in RCW foraging habitat.	✓			✓	✓			✓	✓
	In areas where the use of prescribed fire may be limited, use herbicides or	✓				✓				

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-28

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-28

H-178

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	mechanical means to maintain RCW foraging habitat. In RCW foraging habitat surface danger zones that are not frequently impacted by weapons firing, continue to conduct RCW management the same as for foraging habitat outside of impact areas.	✓							✓	✓
	If tree clearing is to occur during nesting season, screen each inactive cavity tree during the breeding season to verify no trees have been re-colonized.	✓				✓				
	Modify range and target layout to	✓							✓	✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-29

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-179

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Flatwoods Salamander	protect RCW foraging and nesting habitat. During land clearing, construction and road improvements, employ erosion control measures such as silt fences near potential flatwoods salamander habitat. Observe the following restrictions from the Final Rule for the federal listing of the flatwoods salamander: Timber harvesting in pine flatwoods habitat is allowed within a 164-meter (538-foot) radius buffer zone	✓				✓				

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-30

H-180

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	surrounding known flatwoods salamander breeding ponds by using selective harvest only during dry periods; within an outer secondary zone extending from 164 meters (538 feet) to 450 meters (1,476 feet) out from the edge of the breeding pond, a mixture of clear-cutting and selective harvesting is allowed. The rule allows clear-cutting of up to 25 percent of this secondary zone at any given time, as long as 75 percent of the secondary zone remains in pine flatwoods habitat at									

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-31

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-181

Biological Resources

Appendix H

Determination of Impacts		Federally Listed Species									
Species	Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴		
		a basal area of 4.2 to 4.7 square meters per hectare. Instruct vehicle and equipment operators to remain on existing roads when moving within or near potential flatwoods salamander habitat.		✓	✓					✓	
	South of the East Bay River, prohibit ground disturbing activities (i.e., digging) within the 1,500-foot flatwoods salamander buffer, and restrict vehicle traffic to established roads.			✓							
	Avoid pyrotechnics and munitions use in water bodies.	✓									

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-32

H-182

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Okaloosa Darter	Avoid ground disturbing fire suppression activities (bulldozers) in flatwoods salamander habitat.	✓			✓				✓	
	Locate munitions impact areas away from flatwoods salamander ponds.	✓							✓	
	During, land clearing and construction, utilize erosion control measures such as silt fencing near Okaloosa darter streams.	✓					✓			
	Maintain at least a 100-foot vegetated buffer along Okaloosa darter streams.	✓					✓			
	For trees that must be removed within	✓					✓			

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-33

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-183

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	the Okaloosa darter vegetative buffer, hand-cut them and remove them without heavy machinery.									
	Near Okaloosa darter streams, conduct land clearing and construction activities during dry periods to limit the potential for rutting and erosion into darter streams as much as possible.	✓					✓			
	Prohibit equipment and vehicle use, bivouac, and fighting positions on stream slopes near Okaloosa darter streams and in newly restored areas adjacent to	✓			✓		✓			

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-34

H-184

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	Okaloosa darter streams.									
	Use established roads, trails, and bridges when troops and vehicles are crossing Okaloosa darter streams.	✓			✓					
	Mark darter streams on field maps.	✓			✓					
	Avoid pyrotechnics and munitions use in Okaloosa darter streams.	✓			✓					
	Locate munitions impact areas away from Okaloosa darter streams.	✓								
	In locations where the 7SFG(A) ranges appear to impact Okaloosa darter streams, the final	✓								

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-35

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-185

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Freshwater Mussels	surveys and design layouts will be implemented so that riparian areas will not be impacted. At boat landing sites, minimize erosion through restoration/stabilization, rotational use, and avoidance of contact with emergent vegetation along banks and shorelines.			✓						
Gulf Sturgeon	Use only designated boat landing sites. At boat landing sites, minimize erosion through restoration, stabilization, rotational use, and			✓						

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-36

H-186

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Sea Turtles	avoidance of contact with emergent vegetation along banks and shorelines. Use only designated boat landing sites. If surveys indicate a sea turtle nest is within 200 feet of the insertion point, use another insertion point for that mission. During sea turtle season, do not conduct any beachfront activities until after Eglin's NRS completes the morning sea turtle nesting surveys.			✓						

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-37

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-187

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	Coordinate all 7SFG(A) activities on SRI with the NRS prior to beginning the activity. Troops and personnel must avoid sea turtle nests by at least 50 feet, and must not interfere with nesting sea turtles, impede hatching, sea turtles from emerging from the nest and crawling to the Gulf of Mexico, or obscure signs of sea turtle activity. Stage vehicles, helicopters, and watercraft at least 200 feet away from any nest that is found past 60 days		✓							

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-38

H-188

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	into the incubation period. Restore any beach and dune habitats that are impaired by mission activities.		✓							
	Immediately following operation completion, refill all holes and remove all ruts deeper than 2 inches during August through October at nests at incubation day 60 or greater.		✓							
	Avoid vehicular and foot traffic in areas with dunes over 5 feet high.		✓							
	Prohibit driving on the beach during sea turtle season. Properly shield any		✓							

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-39

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-189

Biological Resources

Appendix H

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFC(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	75FSG(A) SOF Ranges and DZs/LZs	75FSG(A) SRI	75FSG(A) Boat Landing Sites ¹	75FSG(A) Interstitial Areas	75FSG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Stratig Areas ³ (LA B-75 and TA C-62)	JSF Bombing Areas ⁴
	light from view of the beach during sea turtle nesting and hatching season.									
	Comply with all avoidance and minimizations measures and all applicable Terms and Conditions from the SRI <i>Mission Utilization Plan Biological Opinion</i> (USFWS, 2005).		✓							
Eastern Indigo Snake	Cease vehicular activity if an indigo snake is sighted, and wait until the animal is out of harm's way before resuming activity. The NRS should be notified immediately.	✓			✓	✓	✓			

January 2008

**Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida**

4-40

H-190

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Piping Plover	Immediately prior to clearing, conduct surveys for indigo snakes. Permitted NRS staff will relocate these animals to another area on Eglin.	✓					✓			
	Direct personnel not to injure, harm, or kill the indigo snake.	✓			✓	✓	✓			
	Follow the <i>Standard Protection Measures for the Eastern Indigo Snake</i> (U.S. Air Force, 2004a).	✓			✓	✓	✓			
	Prohibit 7SFG(A) activities in piping plover critical habitat. The NRS will maintain fencing or signs around critical habitat.		✓							

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-41

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-191

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	Continue piping, plover surveys as scheduled.	✓								
Perforate Lichen	Continue perforate lichen population monitoring as scheduled.	✓								
	In the event that monitoring showed an expansion of lichen cover, expand the fenced area accordingly.	✓								
	Prohibit 7SFG(A) activities in areas with <i>Cladonia perforata</i> populations. The NRS will maintain fencing or signs around these areas.	✓								
All Species	7SFG(A) and JSF must provide conditions and restrictions regarding	✓								✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-42

H-192

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	biological resources to all participants in verbal or written form. Provide maps when necessary.									
	Contain bullets within collection berms and periodically cleanup and dispose of munitions on the firing ranges.	?								
	Use native vegetation for all landscaping and other plantings.	?		?		?	?			
	To reduce potential seed sources, treat areas with known invasive non-native species problems.	?	?		?	?	?			
	To avoid spreading invasive non-native plant species, do	?	?		?	?	?			

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-43

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-193

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	not drive vehicles or boats in areas with known invasive non-native plant species problems; these areas are designated by signs. If a vehicle is driven in such an infested area, clean the vehicle before it is driven to a non-infested area.									
	Follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006a).	✓			✓				✓	✓
	Develop wildfire operational plans with Eglin NRS to identify high wildfire risk conditions and notification procedures that	✓			✓				✓	✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-44

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-44

H-194

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	units will follow to engage fire response personnel when needed.									
	Immediately notify Eglin Fire Department Dispatch of any wildfire started as a result of pyrotechnics or munitions use.	✓			✓				✓	✓
	Hire additional wildland fire positions to respond to the increased number of wildfires and increased manpower needed to conduct prescribed burns around the 7SFG(A) cantonment area and the ranges used by the	✓			✓	✓			✓	✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-45

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-195

Biological Resources

Appendix H

Determination of Impacts

Federally Listed Species

Table 4-9. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	7SFG(A) and JSF: Avoid ground disturbing fire suppression activities (bulldozers) in wetland habitats;	✓			✓				✓	✓

1. Yellow River, East Bay River, Santa Rosa Sound, Chocomauchee Bay, and the near-shore waters of the Gulf of Mexico;
2. Eglin Main Base, Chocomauchee Field, and Dulce Field
3. TA B-75 and TA C-62
4. TA B-82 and TA C-52E
7SFG(A) = 7th Special Forces Group (Airborne); DZ = Drop Zone; IJTS = Initial Joint Training Site; JSF = Joint Strike Fighter; LZ = Landing Zone; NPS = Natural Resources Section; RCW = Red-cockaded Woodpecker; SOF = Special Operations Forces; SRI = Santa Rosa Island; TA = Test Area; U.S. = United States

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-46

H-196

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

4.2 OTHER SPECIES CONSIDERED**4.2.1 Gopher Tortoise**

Impacts may occur to the state-listed gopher tortoise due to burrow collapse or direct physical impacts from vehicles. Certain operations may take place in close proximity to state-listed gopher tortoise burrows. While it is possible that vehicles could crush an individual tortoise, burrow or egg clutch during these exercises, this risk is minimized by the fact that vehicle activity will be limited for the most part to established roads and trails. In the event that a gopher tortoise or burrow is spotted, personnel will avoid the animal and burrow. Personnel will immediately notify the NRS of the location; and in areas where frequent off-road activity may occur, the NRS will evaluate the need for relocation. Vehicle operators will be instructed to cease activity if a gopher tortoise is sighted, and wait until the tortoise is out of harm's way before resuming activity.

Immediately prior to land-clearing, the NRS will conduct a survey of the construction areas to evaluate the presence of any gopher tortoise burrows (Figure 3-2, and Figure 3-6 to Figure 3-8). If gopher tortoises are found, Eglin will apply for a relocation permit from Florida Fish and Wildlife Conservation Commission (FWC). The Air Force will relocate gopher tortoises found to be in imminent danger from construction activities to another area on Eglin AFB. Transportation and release of tortoises will follow guidelines established by the FWC.

Gopher tortoises, if present, may be affected by the noise of JSF and 7SFG(A) munitions, or potentially from direct physical impacts from a projectile. There are no noise criteria or thresholds for hearing impacts to this species, though Bowles et al. (1999) studied sonic boom effects on the desert gopher tortoise. For occasional exposures to impulse noise (sonic booms), Bowles found that gopher tortoise hearing was not affected, but did caution against daily repeated exposures. As with the sonic booms studied by Bowles, bomb events are a low frequency impulse noise but also have the potential for greater effect due to pressure, heat, and other blast effects.

Risk of noise disturbance and direct physical impacts is minimized by protection afforded to the tortoise from its underground burrow. Gopher tortoises are present on many of Eglin's bombing ranges despite the noise and disturbance. The presence of open, sunny habitat in proximity to good quality foraging areas appears to outweigh any negative impacts from bombing. Table 4-10 summarizes avoidance and minimization measures for the gopher tortoise.

Impacts to the gopher tortoise from the Proposed Action will not be significant.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-47

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-197

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

4.2.2 Florida Black Bear

The Proposed Action has the potential to impact black bears from vehicle strikes, noise, and habitat alteration. Development of the proposed 7SFG(A) and JSF cantonment areas, and 7SFG(A) ranges will affect less than one percent of the total area of undeveloped lands on Eglin AFB, which provides black bear habitat throughout the Reservation; therefore, habitat loss for the Florida black bear will be minimal. The possible increase in human-bear interactions is of more concern, particularly those associated with increased vehicular traffic. To reduce the potential for vehicle strikes, vehicle and equipment operators will be instructed to stop and allow bears to move away from the area before continuing activities.

The state-listed Florida black bear potentially occurs within many of the proposed 7SFG(A) ranges and JSF flight training areas, and may be exposed to noise from aircraft and munitions. This species uses a number of different habitats on Eglin as indicated by documented sightings throughout the Eglin reservation. Bears are not limited to any particular geographic area on Eglin and are free to avoid noise and disturbance from munitions. Bears would likely just move away from noisy areas. Additionally, exposure to low-level aircraft noise and munitions noise is likely already occurring given the wide distribution of the black bear on Eglin AFB.

Black bears could be potentially exposed to dye-colored smoke through inhalation, ingestion, direct contact, or bioconcentration. The most likely opportunity for such exposure will be immediately after the smoke has been dispelled, but since bears will most likely leave the area during training exercises, the likelihood of direct exposure to toxic levels of emissions is low. Ingestion or inhalation of particles in sufficient amounts to cause harm is unlikely because of the wind-driven distribution of smoke particles.

Impacts to the black bear from the Proposed Action will not be significant.

4.2.3 Santa Rosa Beach Mouse

It is unlikely that 7SFG(A) activities on SRI will affect the Santa Rosa beach mouse. The chances of an encounter with troops is very low due to the fact that beach mice tend to spend much of their time in burrows that they excavate in the dunes. To reduce the potential for direct physical impacts and habitat impacts, troops will be instructed to avoid dunes greater than five feet high. Avoiding dunes will also reduce impacts to the dune vegetation, which serves as a food source for this species. Vehicle use will be concentrated on established roads and in previously approved areas, and troop movements would leave minimal traces due to their clandestine nature. Thus, impacts to the Santa Rosa beach mouse from the Proposed Action will not be significant.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-48

H-198

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

4.2.4 Florida Bog Frog

The primary potential impacts for the Florida bog frog are crushing, trampling, and erosion from vehicles and troops (typically small groups of less than 12) moving from boat landing sites and DZ/LZs to SOF ranges, within SOF ranges, and between SOF ranges. The bog frog is typically found in herbaceous and shrubby bogs of the Wetland/Riparian ecological association. Sporadic 7SFG(A) ground maneuvering will occur in these areas, with little to no disturbance; however, driving and digging in these areas will be restricted to minimize the potential for impacts to the bog frog. Impacts to the Florida bog frog from the Proposed Action will not be significant.

4.2.5 Dusky Gopher Frog

Of main concern regarding the state-listed gopher frog is the potential to impact breeding sites from sedimentation, hydrologic alteration, and chemicals. Vehicles will not traverse wetlands (including gopher frog ponds), thereby reducing the potential for vehicle impacts to the gopher frog. Erosion control measures such as silt fencing will be used to reduce sediment runoff into the ponds.

Pyrotechnics and munitions have the potential to impact dusky gopher frog health if ingested or accumulated in soils and water. To reduce the potential for leaching from munitions to enter groundwater or runoff to water bodies, containment of bullets within collection berms and periodic cleanup and disposal procedures will occur. Munition impact areas will be located away from dusky gopher frog ponds to reduce the potential for chemical and sedimentation impacts. Table 4-10 summarizes avoidance and minimization measures for the dusky gopher frog.

Impacts to the dusky gopher frog will not be significant.

4.2.6 Pine Barrens Tree Frog

The state-listed pine barrens tree frog is typically found in herbaceous and shrubby bogs of the Wetland/Riparian ecological association. To minimize the potential for impacts to the pine barrens tree frog, heavy equipment use will be restricted in wetlands. Sporadic 7SFG(A) ground maneuvering will occur in these areas, with little to no disturbance; however, driving and digging in these areas will be restricted to minimize the potential for impacts to the pine barrens tree frog. Impacts to the pine barrens tree frog will not be significant.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-49

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-199

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

4.2.7 Florida Pine Snake

The Florida pine snake may occur in sandhills habitat across Eglin. The primary potential impact is crushing by vehicles, both during construction and daily operations. While potential adverse impacts to individual snakes could occur if encountered during project activities, the impacts to overall populations at Eglin will be minimal considering that Eglin has many thousands of acres that provide suitable habitat for the species. Impacts to the Florida pine snake will not be significant.

4.2.8 Shorebirds and Wading Birds

Some state-listed shorebirds and wading birds may be temporarily displaced as a result of noise or movements of 7SFG(A) activities on SRI. Colonies or individual nests of several state-listed shorebird species (least terns, southeastern snowy plovers, and black skimmers) are usually found along the rack line or other suitable habitat along the beach and have the potential to occur within the proposed action areas. State-listed wading birds such as the snowy egret, little blue heron, tricolored heron, and white ibis, forage mainly in wetland areas or along shorelines of saltwater and freshwater water bodies. 7SFG(A) activities will be avoided in marked shorebird nesting habitats.

Land-based activities near nesting areas may result in a flush/startle response. During nesting season, this may result in a potentially increased vulnerability of eggs and chicks to predation. However, foraging species typically move on to other areas, while nesting species return after the general disturbance was over. These activities will also likely scare other species such as predators (e.g., feral cats, coyotes, etc.) from the area, thus reducing the chances of nest predation should nesting birds be flushed.

Recent hurricane events have created prime shorebird nesting habitat all along the barrier island within Eglin boundaries. The NRS has documented several shorebird nesting areas on SRI. To reduce the potential for impacts, the 7SFG(A) will avoid activities in these areas, and will coordinate ground movement operations on SRI through the NRS. 7SFG(A) activities on SRI would be of a transient nature, and any disturbances would be of short duration. Thus, impacts to wading bird and shorebird species from 7SFG(A) activities will not be significant.

4.2.9 Bald Eagle

Aircraft noise from JSF training has the potential to affect the bald eagle nest near TA A-22 south of the Eglin Main Base cantonment area (Figure 3-3). Most commonly, the reaction of birds and wildlife to aircraft noise, particularly when the aircraft is visible to the animal, is some degree of startle response, one response being flushing (i.e., abruptly leaving a nest) (Gladwin et al., 1988). In this case, an animal could

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-50

H-200

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

theoretically leave its nest open to predation, thereby affecting reproductive success (Larkin, 1996).

At the location of the bald eagle nest on Eglin Main Base, aircraft are already a major component of the existing noise environment, thus aircraft noise from JSF air operations will not pose a novel or new threat to the eagle. They have nested at this location for several years, moving from Rocky Bayou to TA A-22 in the mid 1990s. Average noise increases from the addition of new aircraft will not be abruptly noticeable, as flights of this new aircraft are integrated in with other aircraft that currently use this runway on a day to day basis. Changes in flight patterns such as lower altitude or routes closer to the nest would be more likely to have an effect but such changes are not foreseen. In one study, bald eagle response was primarily related to the proximity of a disturbance such as a person or aircraft, rather than to a particular noise (Larkin, 1996); in effect, eagle response was related more to a visual presence.

Noise and human presence associated with ground movements and boats near the eagle nest near TS A-12 on SRI has the potential to disturb the eagle. However, 7SFG(A) operations on SRI would be of a clandestine nature and would involve only a few troops for any particular mission, thus should not result in any loud noise. Additionally, some of the operations would take place at night, removing the visual presence disturbance.

Eglin observes the restrictions detailed in the *National Bald Eagle Management Guidelines* (USFWS, 2007). As pertains to aircraft activities at Eglin Main Base, the guidelines state that aircraft should not operate within 1,000 feet of the nest during the breeding season (01 October to 15 May), except where eagles have demonstrated a tolerance for the activity. For 7SFG(A) activities at SRI, the guidelines state that foot traffic visible from the eagle's nest, should remain at least 330 feet from the nest, and boat traffic should maintain a buffer of 330 feet when possible, but small motorized boats may pass within 330 feet of the nest if the boats minimize trips and avoid stopping in the area.

Impacts to the bald eagle will not be significant.

4.2.10 Southeastern American Kestrel

The Proposed Action may impact the southeastern American kestrel from tree removal, noise, and wildfires. Kestrels typically nest in cavities excavated by woodpeckers in snags (dead trees). They most frequently use decayed longleaf pine trees greater than 9 inches in diameter and 20 feet tall. Kestrels frequently locate their nests in the abandoned longleaf pine nest cavities of the RCW. The inactive and abandoned RCW nests in proximity to the 7SFG(A) ranges and JSF munitions test areas that are tracked by Eglin's RCW monitoring program may represent potential kestrel nesting sites.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-51

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-201

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

Prior to the removal of any inactive RCW trees, the NRS will conduct surveys to check for occupation by the kestrel. If a nest is found, it must be left alone until the nestlings fledge unless the removal is required for training purposes. Construction activities must wait until the nestlings fledge. Wildfires started by munitions may be beneficial or harmful to the kestrel, depending on the intensity of the fire. Fires help to keep vegetation low for better hunting grounds, but if fires burn too hot, cavity trees may be destroyed.

As with the RCW, direct physical impacts are unlikely and noise impacts will be minimal. Research on noise and predatory birds indicates they will startle in response to aircraft overflights, but have been observed to acclimate to this type of disturbance (Anderson et al., 1989). Kestrels will be exposed intermittently to noise from small arms fire, but will likely acclimate to the disturbance over time (Larkin, 1996). Birds that continue to live near test areas are likely accustomed to the types of noise disturbance produced by missions or are not deterred by the disturbance as long as the habitat is suitable.

Most commonly, the reaction of birds and wildlife to aircraft noise, particularly when the aircraft is visible to the animal, is some degree of startle response, one response being flushing (i.e., abruptly leaving a nest; Gladwin et al., 1988). In this case, an animal could theoretically leave its nest open to predation, thereby affecting reproductive success (Larkin, 1996). Research on noise and predatory birds (kestrels are predatory) indicates these types of birds are less likely to startle or flush from noise than other types of birds, such as songbirds. Low response was observed in nesting ospreys (Trimper et al., 1998). Red-tailed hawks exhibited habituation to helicopter noise (Anderson et al., 1989). In general, Manci et al. (1988) found that most raptors did not exhibit a negative response to low-level overflights.

For training, the JSF will use existing runways, routes, and airspace blocks. Birds that continue to live near airfields are likely accustomed to the types of noise disturbance produced by missions or are not deterred by the disturbance as long as the habitat is suitable. Since aircraft are already a major component of the existing noise environment at Eglin, aircraft noise from JSF air operations will not pose a novel or new threat to the kestrel that would cause adverse reactions, other than temporary flight. Table 4-10 summarizes avoidance and minimization measures for the kestrel.

Impacts to the Southeastern American kestrel will not be significant.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-52

H-202

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

4.2.11 Avoidance and Minimization Measures
 The JSF, 7SFG(A), Eglin NRS, and Eglin AFB will implement the avoidance and minimization measures below to reduce or remove impacts to biological resources from JSF and 7SFG(A) cantonment and range activities (Table 4-10).

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Florida Black Bear	Cease vehicular activity if a black bear is sighted, and wait until the animal is out of harm's way before resuming activity. Notify the NRS.	✓			✓	✓	✓			
Santa Rosa Beach Mouse	Avoid dunes greater than five feet high.		✓							
Gopher Tortoise	Cease vehicular activity if a gopher tortoise is sighted, and wait until the animal is out of harm's way before resuming activity. Notify the NRS.	✓			✓	✓	✓			
	Avoid active, inactive, and	✓			✓	✓	✓			

January 2008

Final Formal ESA Section Seven Consultation for
 2005 BRAC Decisions and Related Actions at
 Eglin Air Force Base, Florida

4-53

October 2008

2005 BRAC Decisions and Related Actions
 Final Environmental Impact Statement
 Eglin Air Force Base, Florida

H-203

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	abandoned gopher tortoise burrows by a minimum of 25 feet.									
	In areas where frequent off-road activity may occur, the NRS will evaluate the need for relocation.	✓			✓					
	Immediately prior to land clearing, conduct surveys for gopher tortoises. If gopher tortoise burrows are found to be in imminent danger from construction, Eglin will apply for a relocation permit from the Florida Fish and Wildlife Conservation Commission (FWC). Follow guidelines established by the	✓					✓			

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-54

H-204

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	FWC for transportation and release of tortoises.									
	Should a gopher tortoise burrow be identified within the proposed path of construction, cease work near the burrow until NRS personnel have investigated the burrow and relocated any gopher tortoise to a suitable location.	✓				✓	✓			
Dusky Gopher Frog	During construction, employ erosion control measures such as silt fences near gopher frog ponds.	✓								
	Restrict digging in gopher frog ponds.	✓			✓					
	Restrict troop and vehicle movements	✓			✓					

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-55

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-205

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	in gopher frog ponds.									
	Avoid pyrotechnics and munitions use in water bodies.	✓			✓				✓	
	Avoid ground disturbing fire suppression activities (bulldozers) in dusky gopher frog ponds.	✓			✓				✓	
	Locate munitions impact areas away from dusky gopher frog ponds.	✓							✓	
Pine Barrens Tree Frog	Restrict driving, digging, and heavy equipment use in wetland/riparian areas.	✓			✓					
Florida Bog Frog	Restrict driving, digging, and heavy equipment use in wetland/riparian areas.				✓					

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-56

H-206

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Bald Eagle	Observe the restrictions detailed in the <i>National Bald Eagle Management Guidelines</i> (USEWS, 2007). Foot traffic visible from the eagle's nest should remain at least 330 feet from the nest, and boat traffic should maintain a buffer of 330 feet when possible, but small motorized boats may pass within 330 feet of the nest if the boats minimize trips and avoid stopping in the area. Restrict low-level aircraft flights within 1,000 feet of the eagle nest on Eglin Main Base during the breeding		✓					✓		

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-57

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-207

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Southwestern American Kestrel	season (01 October to 15 May). Survey inactive RCW cavity trees prior to removal to check for occupation by the kestrel. If a nest is found it must be left alone until the nestlings fledge unless the removal is required for training purposes. Construction activities must wait until the nestlings fledge.	✓					✓			
Shorebirds	Avoid 7SFG(A) activities in marked shorebird nesting habitats. Coordinate ground maneuvers on SRI with the NRS.		✓							
All Species	7SFG(A) and JSF must provide conditions and	✓	✓	✓	✓	✓	✓	✓	✓	✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-58

H-208

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	restrictions regarding biological resources to all participants in verbal or written form. Provide maps when necessary.									
	Contain bullets within collection berms and periodically cleanup and dispose of munitions on the firing ranges.	✓								
	Use native vegetation for all landscaping and other plantings.	✓		✓		✓	✓			
	To reduce potential seed sources, treat areas with known invasive non-native species problems.	✓	✓		✓		✓			
	To avoid spreading invasive non-native plant species, do not	✓	✓		✓		✓			

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-59

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-209

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	drive vehicles or boats in areas with known invasive non-native plant species problems. If a vehicle is driven in such an infested area, clean the vehicle before it is driven to a non-infested area.									
	Follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006a).	✓			✓				✓	✓
	Develop wildfire operational plans with Eglin NPS to identify high wildfire risk conditions and notification procedures that units will follow to engage fire response personnel when	✓			✓				✓	✓

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-60

H-210

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Determination of Impacts

Other Species Considered

Table 4-10. Avoidance and Minimization Measures for State-listed T&E Species Affected by JSF and 7SFG(A) Activities, Cont'd

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	needed.									
	Immediately notify Eglin Fire Department Dispatch of any wildfire started as a result of pyrotechnics or munitions use.	✓			✓				✓	✓
	Provide additional wildland fire resources at Eglin.	✓			✓				✓	✓
	Avoid ground disturbing fire suppression activities (bulldozers) in wetland habitats.	✓			✓				✓	✓

¹Yellow River, East Bay River, Santa Rosa Sound, Choctawhatchee Bay, and the near-shore waters of the Gulf of Mexico²Eglin Main Base, Choctaw Field, and Duke Field³TA B-75 and TA C-62⁴TA B-82 and TA C-32E

7SFG(A) = 7th Special Forces Group (Airborne); DZ = Drop Zone; IJTS = Initial Joint Training Site; JSF = Joint Strike Fighter; LZ = Landing Zone; NIS = Natural Resources Section; RCW = Red-cockaded Woodpecker; SRI = Santa Rosa Island; TA = Test Area; U.S. = United States

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

4-61

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-211

Biological Resources

Appendix H

Determination of Impacts

Other Species Considered

Activity	Sea Turtles				Perforate Lichen	Piping Plover		Gulf Sturgeon		RCW	Flatwoods Salamander	Freshwater Mussels	Indigo Snake	Okaloosa Darter
	5/1-10/31		11/1-4/30			Species	Critical Habitat	Species	Critical Habitat					
	Day	Night	Day	Night										
75FG(A) Cantonment	NE	NE	NE	NE	NE	NE	NE	NE	NE	LAA	NLAA	NE	NLAA	NE
75FG(A) Range	NLAA	LAA*	NE	NE	NE	NLAA	NE	NLAA	NLAA	LAA	NLAA	NLAA	NLAA	NLAA
JSF IJTS Cantonment	NE	NE	NE	NE	NE	NE	NE	NE	NE	NLAA	NE	NE	NLAA	NLAA
JSF Flight Training	NE	NE	NE	NE	NE	NE	NE	NE	NE	NLAA	NLAA	NE	NE	NE

75FG(A) = 7th Special Forces Group (Airborne); IJTS = Initial Joint Training Site; JSF = Joint Strike Fighter; LAA = Likely to Adversely Affect; NE = No Effect; NLAA = Not Likely to Adversely Affect; NLAM = Not Likely to Adversely Modify

* "LAA" is incorporated in the Santa Rosa Island Programmatic Biological Opinion (USFWS, 2005)

January 2008

Final Formal ESA Section Seven Consultation for
 2005 BRAC Decisions and Related Actions at
 Eglin Air Force Base, Florida

4-62

H-212

2005 BRAC Decisions and Related Actions
 Final Environmental Impact Statement
 Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Conclusion

5. CONCLUSION

Based on analysis of the potential impacts to federally protected species from direct physical impacts, harassment, and habitat impacts associated with JSF and 7SFG(A) activities, the only species that are likely to be adversely impacted are sea turtles during sea turtle season and the RCW. Sea turtle "take" is incorporated in the *SRI Programmatic Biological Opinion* (USFWS, 2005), and Terms and Conditions from the SRI BO will be implemented as part of this Proposed Action. Avoidance and minimization measures would serve to mitigate potential impacts to sea turtles and other sensitive species. The RCW would not likely be affected by direct impacts; however, BRAC actions are likely to indirectly affect the RCW through habitat impacts such as land clearing, fire suppression, road improvements, and wildfires. Cumulatively, these stressors have the potential to negatively affect certain RCW clusters, primarily in the 7SFG(A) cantonment and Group 1 range area, where RCWs will be subject to the combination of impacts.

The NRS will notify the USFWS immediately if any of the actions considered in this BA are modified or if additional information on listed species becomes available, as a re-initiation of consultation may be required. If impacts to listed species occur beyond what has been considered in this assessment, all operations will cease and the USFWS will be notified. Any modifications or conditions resulting from consultation with the USFWS will be implemented prior to commencement of activities.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

5-1

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-213

Biological Resources

Appendix H

Conclusion

This page is intentionally blank.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

5-2

H-214

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

List of Preparers

6. LIST OF PREPARERS

Name/Title	Project Role	Subject Area	Experience
Nunley, J. Michael Marine Scientist Environmental Scientist M.S. Marine Ecology B.A. Biology	Author	Threatened and Endangered Species	8 years environmental science
Hiers, Stephanie Environmental Scientist B.S. Biology M.S. Conservation Ecology	Author	Threatened and Endangered Species	9 years environmental science
Nation, Mike Environmental Scientist B.S. Environmental Science/Policy, Minor in Geography; A.A. General Science	GIS Lead	Mapping	7 years experience as an environmental consultant; Interagency Coordination; GIS Arc View applications
Peurose, Bob Environmental Scientist/Biologist B.S. Biology Minor in Environmental Science	Author	Threatened and Endangered Species	3 years environmental science

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

6-1

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-215

Biological Resources

Appendix H

List of Preparers

This page is intentionally blank.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

6-2

H-216

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

References

7. REFERENCES

- Andersen, D.E., Rongstad, O.J., and W.R. Mytton, 1989. Response of nesting red-tailed hawks to helicopter overflights. *Condor* 91:296-299.
- Blalock-Herod, H. N., J. J. Herod, and J. D. Williams, 2002. Evaluation of conservation status, distribution, and reproductive characteristics of an endemic Gulf Coast freshwater mussel, *Lampsilis australis* (Bivalvia: Unionidae). *Biodiversity and Conservation*, 11: 1877-1887.
- Bowles, A. E., 1995. Responses of Wildlife to Noise. In *Wildlife and recreationists; coexistence through management and research*. Editors: Knight, R.L. and K.J. Gutzwiller. Pages 109-156.
- Bowles, A. E., S. Eckert, L. Starke, E. Berg, L. Wolski, and J. Matesic, Jr., 1999. Effects of flight noise from jet aircraft and sonic booms on hearing, behavior, heart rate, and oxygen consumption of desert tortoise (*Gopherus agassizii*). AFRL-HE-WP-TR-1999-0170. Sea World Research Institute, Hubbs Marine Research Center, San Diego, CA. 131 pages.
- Busnel, R. G., 1978. Effects of noise on wildlife. National Institute for agricultural Research, Jouy-en-Josas, 78, France.
- Convery, K. M., and J. R. Walters, 2004. Red-cockaded woodpecker home range and foraging partitions. Pages 526-535 in R. Costa, and S. J. Daniels, editors. *Red-cockaded woodpecker: road to recovery*.
- Delaney D. K., L. L. Pater, R. H. Melton, B. A. MacAllister, R. J. Dooling, B. Lohr, B. F. Brittan-Powell, L. L. Swindell, T. A. Beaty, L. D. Carlile and E. W. Spadgenske, 2002. Assessment of Training Noise Impacts on the Red-cockaded Woodpecker: Final Report February 2002.
- Dill, A., 2006a. 75FG(A) Authorized Expendables, LTC Anthony Dill, USASFC G-3, through Richard Bryant, Jr. PM, Deputy Chief of Staff for Engineer, USAFSC, 08 June 2006.
- Dill, A., 2006b. Personal communication via a briefing entitled "Eglin Range Brief. Updated 082218Z June 06-ACD Unclassified." Prepared by LTC Anthony Dill, U.S. Army Special Forces Command, and delivered to Eglin AFB on the range requirements of the 75FG(A).
- Eglin Decision Support System, 2007. *Eglin Natural Resources Section Decision Support System in Oracle platform located at Jackson Guard and 96 CEG CEVSN servers*. Eglin Air Force Base.
- Florida Natural Areas Inventory (FNAI), 1993. "Distribution of the Flatwoods Salamander (*Ambystoma cingulatum*) and the Gopher Frog (*Rana capito*) on Eglin Air Force Base, Florida, Year I," John G. Palis, Tallahassee, Florida.
- Florida Natural Areas Inventory (FNAI), 2001. *Field Guide to the Rare Animals of Florida*. Florida Natural Areas Inventory, Tallahassee, Florida.
- Furman, J., 2007. Personal communication via interview between James Furman, Eglin Natural Resources Section, Fire, and Mike Nunley, SAIC. 14 November 2007.
- Gault, K., 2006. Personal communication via email between Kathy Gault, Eglin Natural Resources Section, Wildlife, and Stephanie Hiers, SAIC. August 2006.
- Gault, K., 2006a. Personal communication via interview between Mike Nunley, SAIC and Kathy Gault at 96 CEG/CEVSNW regarding piping plovers on Eglin AFB on 27 September 2006.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

7-1

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-217

Biological Resources

Appendix H

References

- Gault, K., 2006b. Personal communication via interview between Mike Nunley, SAIC and Kathy Gault at 96 CEG/CEVSNW regarding RCWs and flatwoods salamanders on Eglin AFB in December 2006.
- Hagedorn, B. 2007. Personal communication via interview between Bruce Hagedorn, Eglin Natural Resources Section, Wildlife, and Mike Nunley, SAIC. 14 November 2007.
- Johnson and Baldassarre, 1988. Aspects of the wintering ecology of piping plovers in coastal Alabama. *Wilson Bulletin* 100:214-233.
- Joint Strike Fighter (JSF) Program Office, 2007. Joint Program Office Preliminary Syllabus dated April 2007.
- Larkin, R.P., 1996. *Effects of Military Noise on Wildlife: A Literature Review*. USACERL Technical Report 96/21, January, Center for Wildlife Ecology, Illinois Natural History Survey, Champaign, Illinois.
- Lutz, P. L., J. A. Musick, and J. Wyneken, 2002. *The Biology of Sea Turtles, Volume II*. CRC Press, ISBN 0 8493 1123 3. Excerpt from the chapter on Sensory Biology of Sea Turtles, pages 90-95 photocopied with Title page and Copyright page. 12/17/2002.
- Manci, K. M., D. N. Gladwin, R. Villella, and M. G. Cavendish, 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis*. Prepared by the U.S. Fish and Wildlife Service, National Ecology Research Center, AFESC TR 88-14. 88 pp.
- Miller, B., 2007. Personal communication via interview between Mike Nunley, SAIC and Bob Miller at 96 CEG/CEVSNW regarding sea turtles on Eglin AFB on 27 September 2007.
- NRS GIS, 2007. *Eglin Natural Resources Section Oracle platform at 96 CEG CEVSN servers*. Eglin Air Force Base.
- Pilarczyk, M. M., P. M. Stewart, D. N. Shelton, H. N. Blalock-Herod, and J. D. Williams, 2006. Current and Recent historical freshwater mussel assemblages in the Gulf Coastal Plains. *Southeastern Naturalist*, 5(2): 205-226.
- Roxstrom, J., 2006. Personal communication via electronic mail between Mr. Jeff Roxstrom (796 CES/CEOP) and Ms. Karen Daniels (SAIC) regarding proposed facilities associated with both alternatives, 18 December 2006.
- Tate, B., 2007. Personal communication between Bill Tate, Fisheries Biologist, USFWS, and Mike Nunley on 03 November 2007, concerning the Okaloosa darter population on and off Eglin AFB.
- Trimper, P. G., N. M. Slander, L. M. Lye, D. Lemon, T. E. Chubbs, and G. W. Humphries, 1998. Effects of low-level jet aircraft noise on the behavior of nesting osprey. *Journal of Applied Ecology*, Vol 35, pp 122-130.
- U.S. Army, 1995. *Natural Resources Land, Forest, and Wildlife Management*. Army Regulation 200-3. Headquarters, Department of the Army, Washington, DC.
- U.S. Army, 2006. *Management guidelines for the red-cockaded woodpecker on Army installations*. U.S. Army Headquarters, Washington, D.C.
- U.S. Army Corps of Engineers (USACE), 2007. Communication via electronic mail from Mr. John F. Krishack, P.E., Project Manager Forward (CESAM-PM-TA) (U.S. Army Corps of Engineers, Mobile

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

7-2

H-218

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

References

- District) to Mr. Rowland Randall (CIV USAF 96 CEG/CEV), regarding Air Force Form 813 for Access Road and Cantonment Soil Borings 7th Special Forces Group (Airborne), 9 January 2008.
- U.S. Air Force, 1997. Environmental Effects of Self-Protection Chaff and Flares. U.S. Air Force, Air Combat Command. August 1997.
- U.S. Air Force, 2001. *Eglin Air Force Base Range Road Maintenance Handbook*. January – December 2001.
- U.S. Air Force, 2003. *Amphibious Ready Group/Marine Expeditionary Unit Readiness, Final Environmental Assessment*. U.S. Marine Corps, Department of the Navy, Air Armament Center (Cooperating Agency), Eglin Air Force Base, Florida. April 2003.
- U.S. Air Force, 2004. Estuarine and Riverine Areas Final Programmatic Environmental Assessment, Eglin AFB, FL. AAC 46 TW/XPE. June 2004.
- U.S. Air Force, 2004a. Standard Protection Measures for the Eastern Indigo Snake (Revised 12 February 2004).
- U.S. Air Force, 2006. Threatened and Endangered Species Component Plan. CEG/CEVSN Eglin AFB, Florida.
- U.S. Air Force, 2006a. Eglin's Wildfire Specific Action Guide Restrictions.
- U.S. Air Force, 2007. Integrated Natural Resources Management Plan, 2007-2011. CEG/CEVSN Eglin AFB, Florida.
- U.S. Fish and Wildlife Service (USFWS), 1997. Letter from USFWS to Eglin AFB regarding inactive RCW trees on Eglin Main Base.
- U.S. Fish and Wildlife Service (USFWS), 1998. Okaloosa Darter (*Etheostoma okaloosae*) Recovery Plan (Revised). Atlanta, GA 42p.
- U.S. Fish and Wildlife Service (USFWS), 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*): second revision. U.S. Fish and Wildlife Service, Atlanta, GA. 296 pp.
- U.S. Fish and Wildlife Service (USFWS), 2005. Biological Opinion Issued to Eglin AFB on Santa Rosa Island Mission Utilization Plan. USFWS Southeast Region, Panama City Field Office. 01 December 2005.
- U.S. Fish and Wildlife Service (USFWS), 2007. USFWS National Bald Eagle Management Guidelines for the bald eagle in the Southeast region. May 2007.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

7-3

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-219

Biological Resources

Appendix H

References

This page is intentionally blank.

January 2008

Final Formal ESA Section Seven Consultation for
2005 BRAC Decisions and Related Actions at
Eglin Air Force Base, Florida

7-4

H-220

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Attachment 3
Formal ESA Section Seven Opinion

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-221

Biological Resources

Appendix H

This page is intentionally blank.

H-222

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

**2005 BASE REALIGNMENT AND CLOSURE
(BRAC) DECISIONS AND RELATED ACTIONS
AT EGLIN AIR FORCE BASE, FLORIDA**

**Biological Opinion
July 11, 2008**

**Prepared by:
U.S. Fish and Wildlife Service
Panama City, FL**



October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-223

Biological Resources

Appendix H

Table of Content

List of Figures.....	ii
List of Tables.....	iii
Consultation History.....	3
Avoidance and Minimization Measures.....	9
Description of the Action Area.....	29
STATUS OF THE SPECIES/CRITICAL HABITAT.....	30
Species/critical habitat description.....	30
Life history.....	31
Status and distribution.....	34
Analysis of the species likely to be affected.....	35
ENVIRONMENTAL BASELINE.....	36
Status of the species within the action area.....	36
Factors affecting species environment within the action area.....	39
EFFECTS OF THE ACTION.....	40
Factors to be considered.....	40
Analyses for effects of the action.....	45
Direct effects.....	45
Species' response to the proposed action.....	53
CUMULATIVE EFFECTS.....	55
CONCLUSION.....	55
INCIDENTAL TAKE STATEMENT.....	56
AMOUNT OR EXTENT OF TAKE ANTICIPATED.....	56
EFFECT OF THE TAKE.....	57
REASONABLE AND PRUDENT MEASURES.....	58
TERMS AND CONDITIONS.....	58
CONSERVATION RECOMMENDATIONS.....	60
REINITIATION NOTICE.....	61
LITERATURE CITED.....	62

Appendix H

Biological Resources

List of Figures

Figure 1. Location of Eglin AFB and Overland Air Space.....	7
Figure 2. Location of Proposed Action.....	8
Figure 3. Action Area	29
Figure 4. Eglin's Current Breeding pairs and Active Clusters	38
Figure 5. Eglin Recovery Goal and Mission Flexibility Goal.....	38
Figure 6. Sensitive Species at 7SFG(A) Cantonment and Group 1 SOF Range Locations.....	42
Figure 7. Road Improvements, ACP, Sewer Line, and Sensitive Species Locations	43
Figure 8. Fire Suppressed and Limited Access Areas	44

Biological Resources

Appendix H

List of Tables

Table 1. Species and Critical Habitat Evaluated for Effects and those where the Service has concurred with a "Not Likely Adversely Affected" Determination.	2
Table 2. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities	9
Table 3. Biological Opinions within the USFWS Panama City Office Boundaries that have been issued for adverse impact to the RCW.	35
Table 4. Foraging Habitat Variable Standards for Red-cockaded Woodpeckers	49
Table 5. Acres of RCW Foraging Habitat Cleared	51
Table 6. Maximum Number of Inactive RCW Trees to be Cleared	51
Table 7. The estimated number of individuals and habitats affected for the proposed project, based on the best available commercial and scientific informatoin	57
Table 8. Summary of anticipated incidental take and estimated take following the implementation of the RPMs	59

Biological Resources

Appendix H

This biological opinion refers only to the potential effects to the federally endangered RCW. Table 1 identifies other federally listed species occurring within the Action Area. Eglin's NRS summarized potential impacts to these species from actions associated with the BRAC in a Draft EIS (dated March 2008) and accompanying biological assessment. Provided Eglin's NRS follows all proposed avoidance and minimization measures, the Service concurs with Eglin's determination that BRAC activities are not likely to adversely affect the Gulf sturgeon (*Acipenser oxyrinchus desotoi*), Gulf sturgeon critical habitat, Okaloosa darter (*Etheostoma okaloosae*), flatwoods salamander (*Ambystoma cingulatum*), piping plover (*Charadrius melodus*), piping plover critical habitat, eastern indigo snake (*Drymarchon corais couperi*), and perforate lichen (*Cladonia perforata*). Four freshwater mussels, southern sandshell (*Lampsilis australis*), fuzzy pigtoe (*Pleurobema strodeanum*), southern kidneyshell (*Ptychobranthus jonesi*), and Choctaw bean (*Villosa choctawensis*), which are federal candidates, are also not likely to be adversely affected. As stated in NRS's BA for BRAC, the threatened loggerhead sea turtle (*Caretta caretta*), the endangered green sea turtle (*Chelonia mydas*), the endangered leatherback sea turtle (*Dermochelys coriacea*), and the endangered Kemp's ridley sea turtle (*Lepidochelys kempi*) on Santa Rosa Island may be affected, but these species were covered under the Santa Rosa Island (SRI) Mission Utilization Plan Biological Opinion (SRI Programmatic) (USFWS 2005).

Table 1. Species and Critical Habitat Evaluated for Effects and those where the Service has concurred with a "Not Likely Adversely Affected" Determination.

Species or Critical Habitat	Present in Action Area	Not Likely Adversely Affected
Gulf sturgeon	yes	NLAA
Gulf sturgeon critical habitat	yes	NLAA
Okaloosa darter	yes	NLAA
Flatwoods salamander	yes	NLAA
piping plover	yes	NLAA
piping plover critical habitat	yes	NLAA
Eastern indigo snake	yes	NLAA
perforate lichen	yes	NLAA
southern sandshell	yes	NLAA
fuzzy pigtoe	yes	NLAA
southern kidneyshell	yes	NLAA
Choctaw bean	yes	NLAA

2

H-228

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Consultation History

September 8, 2005	The 2005 Defense Base Closure and Realignment Commission (DBCRC) completed its review of initial base realignment and closure (BRAC) recommendations made by the Secretary of Defense and forwarded a Final Report with a list of recommended base closures and realignments to the President.
February – July, 2006	During this period, Eglin AFB reviewed possible scenarios to implement BRAC recommendations and determined that there would be potential impacts to federally listed species.
July 2006 - December 2007	The Service participated in monthly telephone conferences with the Eglin Natural Resources Section and updates were given on the status of the preferred alternative for the BRAC actions.
January 17, 2008	The Service received a Biological Assessment and cover letter dated January 15, 2008 initiating formal section 7 consultation.
February 12, 2008	Eglin Natural Resources Section briefed the Service's Panama City Field Office on the BRAC actions.
February 29, 2008	The Service requested additional information in a letter dated February 29, 2008.
March 14, 2008	Eglin Natural Resources Section provided a response to the Service's request for additional information.
May 08, 2008	The first draft of the Biological Opinion is prepared.
June 24, 2008	The Service and Eglin NRS discuss several concerns via conference call.

BIOLOGICAL OPINION**DESCRIPTION OF PROPOSED ACTION**

The proposed action would result in a group of new missions at Eglin Air Force Base (AFB) (**Figure 1**) mandated by implementation of the Base Realignment and Closure (BRAC) Commission decisions. The BRAC implementation at Eglin AFB would require: constructing the 7th Special Forces Group (Airborne) (7SFG(A)) cantonment area; constructing the Joint

3

October 2008

**2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida**

H-229

Biological Resources

Appendix H

Strike Fighter (JSF) Initial Joint Training Site (IJTS) cantonment area; and providing adequate access and capability to fulfill training missions of the two new users—the 7SFG(A) and the JSF Program (**Figure 2**).

Known RCW clusters are present in the areas under the Military Training Routes (MTRs) VR-1082 and VR-1085, with a concentration of RCWs in Conecuh National Forest in south Alabama, and in the northeast portion of Eglin Range. It is unknown if and where RCWs may be located on private lands in the area. F-35 aircraft would fly as low as 500 feet Above Ground Level (AGL) along certain segments of VR-1082 and VR-1085, generating Sound Exposure Level (SEL) of 129 decibel (dB). Currently, these routes are flown at the same altitudes. However, the loudest aircraft that uses the routes frequently is the F-15, which generates an SEL of 112 dB at 500 AGL.

As with MTRs VR-1082 and VR-1085 under the Tyndall Military Operating Area (MOA), flights may occur over Lathrope Bayou Tract, land under private ownership and Bureau of Land Management ownership and management. These lands are located just north of Tyndall property. Flight patterns will increase over RCW clusters located on Apalachicola National Forest lands. Any RCWs present under the Tyndall MOA flight paths may be exposed to SEL up to 133 dB from F-35 flights at 300 feet AGL. The loudest overflight event currently occurring regularly under Tyndall MOAs is 116 dB SEL at 300 feet AGL, as generated by F-15 aircraft.

7SFG(A) Proposed Action

The 7SFG(A) would construct a Special Operations Forces (SOF) Compound, which would contain the cantonment area for the 7SFG(A). Most weapons systems training for the 7SFG(A) would require the use of 13 ranges specifically designed for certain weapons training certifications. All 7SFG(A) munitions would fit inside the existing Munitions Storage Area (MSA) at Duke Field. The majority of the land required for training would be utilized for mounted (in vehicles) and dismounted (on foot) maneuvers.

Cantonment Area

Cantonment requirements for the 7SFG(A) realignment would include establishing a SOF Compound (approximately 500 acres) composed of several functional building types, including administrative, industrial, warehouse, and residential. A number of road improvements, such as asphaltting or widening, are planned to provide proper access to the 7SFG(A) cantonment area and ranges. Widening would include providing areas (right of ways) on each side of the road for water, sewer, and electrical lines. The area impacted would not be more than 400 feet in width overall and approximately 45 acres. Details on cantonment area construction and road improvements are available in the BRAC EIS (U.S. Air Force 2008).

Appendix H

Biological Resources

Range Training

The 7SFG(A) Range Training involves utilization of the Eglin Range in three areas: (1) Firing Ranges, (2) Aircraft Operations, and (3) Water Operations and Ground Maneuvers. The 7SFG(A) requires developed range land with facilities, utilities, roads, trails, and other assets for weapons training and certification (6,736 acres). Ammunitions expenditures at the SOF ranges would include small caliber, large caliber, mines, demolitions, grenades, and rockets.

The 7SFG(A) range training would require the use of airspace for fixed-wing and rotary-wing operations. The 7SFG(A) would use existing Landing Zones (LZs) and Drop Zones (DZs), plus two new proposed DZs. The 7SFG(A) air operations would occur over the SOF Ranges mentioned previously as well as over the water operations and ground maneuver areas.

The water operations and ground maneuver requirements for the 7SFG(A) provide training for a wide variety of activities such as reconnaissance, surveillance, visibility training, convoy training, and so on. Water operations involving troops and small rubber combat boats may occur in adjacent rivers, Choctawhatchee Bay, and nearshore coastal areas. Ground training includes a number of activities, but is generally the movement of dismounted soldiers (12-man teams) through wooded areas of the interstitial area. Some blank small-arms ammunition, hand flares, smoke grenades, or other training ammunition are expended during certain operations. Ground vehicle movement is normally restricted to the existing road and trail network, but some training integrates the use of all-terrain vehicles (ATVs) or small trucks.

Details on 7SFG(A) air operations, firing ranges, water operations, and ground maneuvers are available in the BRAC EIS (U.S. Air Force 2008).

JSF Program Proposed Action

The purpose of the proposed action for the JSF Program is to provide the facilities, classrooms, instruction, equipment, ranges, and airspace needed to teach aviators and maintenance technicians how to properly operate and maintain the new JSF weapon system. The aircraft accompanying the JSF IJTS and beddown is the F-35, which is a supersonic, single-seat, single-engine aircraft capable of performing and surviving lethal strike warfare missions.

Cantonment Area

The JSF IJTS would require between 100 and 200 acres, and would provide the facilities to house academic classrooms, virtual trainers, flying training squadrons, and hardware trainers. Initial requirements involve constructing approximately 23 new facilities or buildings, taxiways, and runways. The JSF IJTS would use the existing MSA on Eglin Main Base.

Biological Resources

Appendix H

Flight Training

JSF flights are designed to teach the students various skills, such as flying in formation, advanced aircraft handling, and tactics and weapons used when approached by enemy aircraft. Training exercises would occur five days per week with most flights occurring during the day. On average, approximately 122 sorties would be conducted per day.

All departures and terminations would occur from Eglin Main Base. The other training events would occur at the three airfields—Duke Field, Choctaw Field, and Eglin Main. The JSF would utilize a variety of Special Use Airspace (SUA) on a routine basis, including Warning Area W-151, Tyndall Military Operating Areas (MOAs), VR-1082, and VR-1085. The JSF flight training would use restricted areas (R-2914/15/18/19) for air-to-surface munitions drops (live and inert guided bomb units) and strafing runs (25-mm), to simulate attacks on threat emitters, and to practice evasive maneuvers. For strafing, the JSF flight training would use existing targets on Training Area (TA) C-62 and TA B-75. For both inert and live bombs, existing targets on TAs C-52E and B-82 would be used. Details on JSF air operations are available in the BRAC EIS (U.S. Air Force 2008).

[This area intentionally left blank.]

Appendix H

Biological Resources

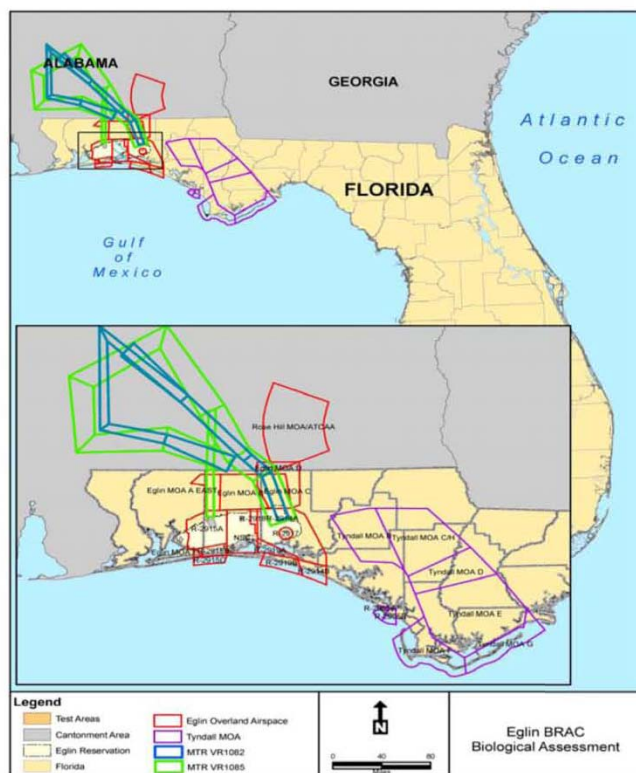


Figure 1. Location of Eglin AFB and Overland Air Space.

Biological Resources

Appendix H



8

H-234

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Avoidance and Minimization Measures

The JSF, 7SFG(A), Eglin Natural Resources Section (NRS), and Eglin AFB will implement the Avoidance and Minimization Measures below to reduce or remove impacts to biological resources from JSF and 7SFG(A) cantonment and range activities (Table 2).

Table 2. Avoidance and Minimization Measures for Federally Listed T&E Species Affected by JSF and 7SFG(A) Activities.

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF IJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Red-cockaded Woodpecker	Continue monitoring of RCWs in the area by the Eglin NRS. Follow the <i>Management Guidelines for the Red-Cockaded Woodpecker on Army Installations</i> , which details activities that are allowed and those that are restricted near active RCW trees (U.S. Army, 2006) (Table 4-1). Within 200 feet of marked cavity trees allow only military activities of a	✓			✓	✓		✓	✓	✓

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	transient nature (less than two hours occupation).									
	Within the 200 foot buffer, prohibit bivouacking, excavating, digging, and establishing command posts.	✓			✓	✓				
	Prohibit military vehicles from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road or maintained trail or firebreak.	✓			✓	✓				
	For protected clusters in areas of the Eglin reservation where ground training will occur, mark buffers for all suitable cavity and cavity start trees prior to mission initiation. Warning	✓			✓	✓				

10

H-236

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	signs will be posted at reasonable intervals along the 200-foot perimeter of cavity trees facing to the outside of the buffer zone and along roads, maintained trails and firebreaks, and other likely entry points into the buffer zone. Do not allow longleaf pine trees larger than 5 feet in height to be cut or destroyed, unless written permission has been granted by the NRS. Immediately report to range control known damage to any marked cavity or cavity start tree and/or any known extensive soil disturbance in and around RCW	✓			✓					

11

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-237

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) Ranges SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas
	clusters; range control will notify NRS biologists immediately.									
	Within 3 working days of notification, the Eglin NRS will reprovision a cavity tree if one is destroyed due to training activity.	✓			✓					
	If a unit causes damage to training land within a cluster, the responsible unit will coordinate with the NRS to repair damage as soon as practicable (normally within 3 working days of notification).	✓			✓					
	All digging for military training activities in RCW habitat management units will be filled and inspected upon	✓			✓					

12

H-238

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	completion of training.									
	Continue prescribed burning as much as possible in RCW foraging habitat.	✓			✓	✓			✓	✓
	In areas where the use of prescribed fire may be limited, use herbicides or mechanical means to maintain RCW foraging habitat.	✓				✓				
	In RCW foraging habitat in direct fire areas that are not directly impacted by weapons firing, continue to conduct RCW management the same as for foraging habitat outside of impact areas.	✓							✓	✓
	If tree clearing is to occur during nesting season, screen each	✓				✓				

13

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-239

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Flatwoods Salamander	inactive cavity tree during the breeding season to verify no trees have been recolonized.									
	Modify range and target layout to protect RCW foraging and nesting habitat.	✓							✓	✓
Flatwoods Salamander	During land clearing, construction and road improvements, employ erosion control measures such as silt fences near potential flatwoods salamander habitat.	✓				✓				
	Observe the following restrictions from the Final Rule for federal listing of the flatwoods salamander: Timber harvesting in pine flatwoods habitat is	✓			✓	✓				

14

H-240

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

1 APPLICABLE LAWS AND REGULATIONS

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Intersitial Areas	7SFG(A) Cantonment	JSF JITS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	allowed within a 164-meter (538-foot) radius buffer zone surrounding known flatwoods salamander breeding ponds by using selective harvest only during dry periods; within an outer secondary zone extending from 164 meters (538 feet) to 450 meters (1,476 feet) out from the edge of the breeding pond, a mixture of clear-cutting and selective harvesting is allowed. The rule allows clear-cutting of up to 25 percent of this secondary zone at any given time, as long as 75 percent of the secondary zone remains in pine flatwoods habitat at a basal area of									

15

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-241

2

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	4.2 to 4.7 square meters per hectare.									
	Instruct vehicle and equipment operators to remain on existing roads when moving within or near potential flatwoods salamander habitat.	✓			✓	✓				
	South of the East Bay River, prohibit ground disturbing activities (i.e., digging) within the 1,500-foot flatwoods salamander buffer, and restrict vehicle traffic to established roads.				✓					
	Prohibit pyrotechnics and munitions use in water bodies.	✓			✓				✓	
	Prohibit ground disturbing fire suppression activities (bulldozers) in flatwoods salamander	✓			✓				✓	

16

H-242

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Okaloosa Darter	habitat.	✓							✓	
	Locate munitions impact areas away from flatwoods salamander ponds.									
	During land clearing and construction, utilize erosion control measures such as silt fencing near Okaloosa darter streams.	✓					✓			
	Maintain at least a 100-foot vegetated buffer along Okaloosa darter streams.	✓					✓			
	For trees that must be removed within the Okaloosa darter vegetative buffer, hand-cut them and remove them without heavy machinery.	✓					✓			
	Near Okaloosa darter streams, conduct land	✓					✓			

17

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-243

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	clearing and construction activities during dry periods to limit the potential for rutting and erosion into darter streams.									
	Prohibit equipment and vehicle use, bivouac, and fighting positions on stream slopes near Okaloosa darter streams and in newly restored areas adjacent to Okaloosa darter streams.	✓			✓		✓			
	Use established roads, trails, and bridges when troops and vehicles are crossing Okaloosa darter streams.	✓			✓					
	Mark darter streams on field maps.	✓			✓					
	Prohibit pyrotechnics and munitions use in Okaloosa darter	✓			✓					

18

H-244

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Freshwater Mussels	streams. Locate munitions impact areas away from Okaloosa darter streams.	✓								
	In locations where the 7SFG(A) ranges appear to impact Okaloosa darter streams, the final surveys and design layouts will be implemented so that riparian areas will not be impacted.	✓								
Freshwater Mussels	At boat landing sites, minimize erosion through restoration/stabilization, rotational use, and avoidance of contact with emergent vegetation along banks and shorelines.			✓						
	Use only designated boat landing sites.			✓						

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
Gulf Sturgeon	At boat landing sites, minimize erosion through restoration, stabilization, rotational use, and avoidance of contact with emergent vegetation along banks and shorelines. Use only designated boat landing sites.			✓						
Sea Turtles	If surveys indicate a sea turtle nest is within 200 feet of the insertion point, use another insertion point for that mission. During sea turtle season, do not conduct any beachfront activities until after Eglin's NRS completes the morning sea turtle nesting surveys. Coordinate all		✓							

20

H-246

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	7SFG(A) activities on SRI with the NRS prior to beginning the activity. Troops and personnel must avoid sea turtle nests by at least 50 feet and must not interfere with nesting sea turtles, impede hatching sea turtles from emerging from the nest and crawling to the Gulf of Mexico, or obscure signs of sea turtle activity. Stage vehicles, helicopters, and watercraft at least 200 feet away from any nest that is found past 60 days into the incubation period. Restore any beach and dune habitats that are impaired by mission activities.		✓							

21

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-247

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	Immediately following operation completion, refill all holes and remove all ruts deeper than 2 inches during August and September at nests at incubation day 60 or greater.		✓							
	Avoid vehicular and foot traffic in areas with dunes over 5 feet high.		✓							
	Prohibit driving on the beach during sea turtle season.		✓							
	Properly shield using wildlife lighting any light from view of the beach during sea turtle nesting and hatching season.		✓							
	Comply with all avoidance and minimizations measures and all		✓							

22

H-248

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and T/A C-62)	JSF Bombing Areas ⁴
Eastern Indigo Snake	<p>Applicable Terms and Conditions from the <i>SRI Mission Utilization Plan Biological Opinion</i> (USFWS, 2005).</p> <p>Cease vehicular activity if an indigo snake is sighted, and wait until the animal is out of harm's way before resuming activity. The NRS should be notified immediately.</p> <p>Immediately prior to clearing, conduct surveys for indigo snakes. Permitted NRS staff will relocate these animals to another area on Eglin.</p> <p>Direct personnel not to injure, harm, or kill the indigo snake(s).</p>	✓				✓	✓			

23

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-249

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	Follow the <i>Standard Protection Measures for the Eastern Indigo Snake</i> (U.S. Air Force, 2004).	✓			✓	✓	✓			
Piping Plover	Prohibit 7SFG(A) activities in piping plover critical habitat. The NRS will maintain fencing or signs around critical habitat.		✓							
	Continue piping plover surveys as scheduled.		✓							
	New locations consistently used by piping plovers will be given the same protection afforded the critical habitat units (i.e. posting and signing, prohibit troop access).		✓							
Perforate Lichen	Continue perforate lichen population monitoring as		✓							

24

H-250

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	scheduled.									
	In the event that monitoring showed an expansion of lichen cover, expand the fenced area accordingly.		✓							
	Prohibit 7SFG(A) activities in areas with <i>Cladonia perforata</i> populations. The NRS will maintain fencing or signs around these areas.		✓							
All Species	7SFG(A) and JSF must provide conditions and restrictions regarding biological resources to all participants in verbal or written form. Provide maps when necessary.	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Contain bullets within collection berms and	✓								

25

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-251

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	periodically cleanup and dispose of munitions on the firing ranges.									
	Use native vegetation for all landscaping and other plantings.	✓		✓		✓	✓			
	To reduce potential seed sources, treat areas with known invasive non-native species problems.	✓	✓		✓	✓	✓			
	To avoid spreading invasive non-native plant species, do not drive vehicles or boats in areas with known invasive non-native plant species problems; these areas are designated by signs. If a vehicle is driven in such an infested area, clean the vehicle before it is driven to a non-infested area.	✓	✓		✓	✓	✓			

26

H-252

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	Follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force, 2006).	✓			✓				✓	✓
	Develop wildfire operational plans with Eglin NRS to identify high wildfire risk conditions and notification procedures that units will follow to engage fire response personnel when needed.	✓			✓				✓	✓
	Immediately notify Eglin Fire Department Dispatch of any wildfire started as a result of pyrotechnics or munitions use.	✓			✓				✓	✓
	Hire additional wildland fire positions to respond to the increased	✓			✓	✓			✓	✓

27

October 2008

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

H-253

Biological Resources

Appendix H

Species	Avoidance and Minimization Measures	7SFG(A) SOF Ranges and DZs/LZs	7SFG(A) SRI	7SFG(A) Boat Landing Sites ¹	7SFG(A) Interstitial Areas	7SFG(A) Cantonment	JSF LJTS	JSF Airfields ²	JSF Strafing Areas ³ (TA B-75 and TA C-62)	JSF Bombing Areas ⁴
	number of wildfires and increased manpower needed to conduct prescribed burns around the 7SFG(A) cantonment area and the ranges used by the 7SFG(A) and JSF.									
	Avoid ground disturbing fire suppression activities (bulldozers) in wetland habitats.	✓			✓				✓	✓

28

H-254

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

Appendix H

Biological Resources

Description of the Action Area

The Service has described the Action Area to include the habitats within and adjacent to Eglin AFB and the land areas under the SUA used for JSF flight training. The land area of the Eglin Military Complex is comprised of 464,000 acres of test areas and interstitial areas (the areas between the test areas). Proposed BRAC activities would occur within both the test areas and interstitial areas. Eglin is found within the Northeast Gulf Plains Ecoregion in Santa Rosa, Okaloosa, and Walton counties. The Action Area is defined as the Sandhills, upland pine and flatwoods community types found within the 450 RCW Management Emphasis Area as the area outlined in red in **Figure 3**.

Research documents that noise effects from existing military flight activities over RCW clusters are negligible effects. We have therefore not included areas off of Eglin's Reservation as part of the Action Area.

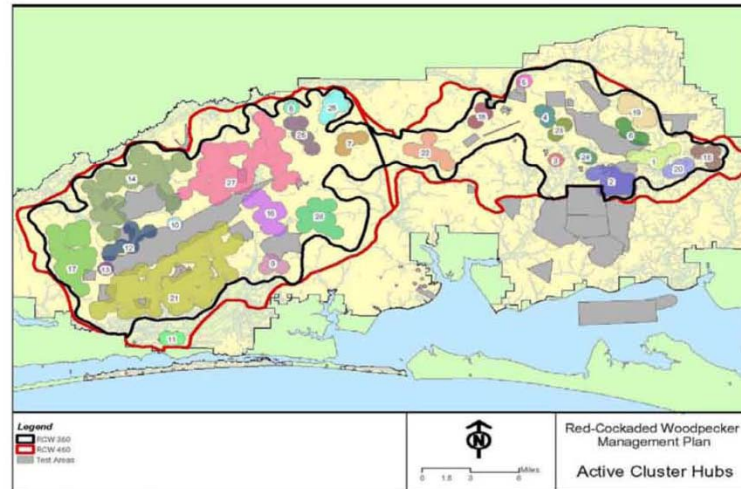


Figure 3. Action Area.

The total acreage of the Sandhills, upland pine, and flatwoods community types in the Action Area is 236, 936 acres. Five broad ecological associations exist on Eglin: the Sandhills, Wetland/Riparian, Flatwoods, Barrier Island, and Grassland/Shrub. Because most of the land area under the SUA outside of Eglin is privately owned, exact habitat types are unknown; however, they are assumed to be historically similar to those on Eglin, but with greater habitat alterations.

Biological Resources

Appendix H

The test areas are mainly dominated by the Grassland/Shrub ecological association. Fire or machinery maintains this habitat type on test areas. The Grassland/Shrub association is not common within the interstitial areas, although some portions of the interstitial areas have consequently become grassland/shrublands (i.e., Duke Field and auxiliary fields) due to prior clearing efforts.

The Sandhills ecological association is the largest ecological association within the interstitial areas. The fire-dependent Sandhills association covers 78 percent of the Eglin reservation. Mechanically established longleaf pine, slash pine and sand pine plantations populate this association. The longleaf pine forest component of this association is globally very rare. Eglin's Integrated Natural Resources Management Plan (INRMP) states that "as little as 0.5 percent of old growth longleaf pine forest remain globally and Eglin's Sandhills contain more than 90 percent of these remnant stands."

Those remaining portions of the interstitial areas not in the Sandhills or Grassland /Shrub associations are in different vegetative communities within the Wetland/Riparian, Flatwoods, and Barrier Island associations. Most of Eglin's flatwoods are located in the southern portion of the reservation or are associated with stream/river systems. This fire-dependent community typically has an overstory of longleaf or slash pine with an open, herbaceous understory. The Yellow River borders much of Eglin's northern boundary. It is an Outstanding Florida Water and an Aquatic Preserve.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

The red-cockaded woodpecker (RCW) is a territorial, non-migratory, cooperative breeding species (Lennartz et al. 1987; Walters et al. 1988) and is the only North American woodpecker that exclusively excavates its roost and nest cavities in living pine trees. In 1970, the Service listed the RCW as endangered (Federal Register 35:16047), and in 1973, the RCW was provided protection as an endangered species with the passage of the Endangered Species Act. No critical habitat is designated for the RCW.

Historically, the RCW occupied a wide range throughout old-growth, fire-maintained pine ecosystems of the southern United States. Although still widely distributed, the range of the RCW is now reduced and fragmented as a result of past and present human activities (e.g., timber harvesting and urban development) and natural factors (e.g., hurricanes and pine beetle outbreaks). The remaining RCW populations exist primarily on Federal lands located in the Coastal Plain from North Carolina to Texas, the Piedmont of Georgia and Alabama, the Sandhills of North Carolina and South Carolina, and the interior highlands of Arkansas, Oklahoma, and Kentucky (Costa and Walker 1995).

Appendix H

Biological Resources

Life history

The RCW has an advanced social system that revolves around family groups. A typical RCW group includes one pair of breeding birds, the current year's offspring (if any), and zero to four "helpers". Helpers are usually male offspring from previous breeding seasons that assist the breeding pair by incubating eggs, feeding the young, excavating cavities, and defending the territory (Ligon 1970; Lennartz and Harlow 1979; Lennartz et al. 1987; Walters et al. 1988). The RCW nesting season occurs from April to July. Incubation lasts approximately 9-10 days, and the young fledge 24 to 26 days after hatching. Some juvenile males disperse from their natal territory prior to the next breeding season in an attempt to find vacant territories, or to establish their own (Hooper et al. 1980; USFWS 2003a). Others may remain and become helpers during subsequent nesting seasons. Most juvenile females disperse after fledging, although some may remain with the group as helpers (Walters et al. 1988). The average dispersal distance of fledgling males and females is about three miles (Walters 1991; Letcher et al. 1998).

Each group of RCWs occupies a discrete territory consisting of its cavity trees, called a cluster, and adjacent foraging habitat (Walters 1990). The RCW requires mature (usually 60 or more years old), live pine trees to excavate its nesting and roosting cavities. The cavity trees are essential to the RCW because they provide shelter and a place to nest and raise young (Ligon 1970). A typical cluster contains between one and 20 cavity trees, and the breeding male usually chooses the most recently excavated natural cavity as the nest tree, or selects cavity trees with higher resin yields (Conner and Rudolph 1989). Such cavity trees may enhance the survival of the nestlings by decreasing the parasite load of nestlings and incubating adults, and providing a resin barrier to snake predation.

RCW cluster stands are typically less dense than surrounding stands and may be the least dense stands available (USFWS 2003a). For clusters, basal areas as low as 40 feet²/acre in longleaf stands and from 40 to 60 feet²/acre in shortleaf/loblolly stands are suitable (Conner et al. 1991). Seedtree and shelterwood cuts with excessive pine or hardwood midstory, however, are not acceptable as nesting habitat. Once established, clusters are often utilized for many consecutive years or even decades (Walters 1990). Hardwood midstory lessens the habitat quality, eventually leading to cavity abandonment when the hardwood midstory reaches cavity height (Conner and O'Halloran 1987; Costa and Escano 1989). Cluster abandonment may also occur as a result of displacement by competing cavity dwellers, or stochastic events such as hurricanes (Conner and O'Halloran 1987).

RCWs scale and probe bark on the trunks and limbs of living pine trees while foraging for insects. The amount of foraging area used by a group is dependant upon the quality of the habitat and population density. Research indicates that birds generally forage within one-half mile of the cluster (USFWS 2003a). RCW home ranges may vary seasonally, and encompass 60 to 300 acres. Habitat typically consists of open pine and/or pine/hardwood forests. Although in some habitats RCWs will use smaller pine trees as foraging substrate (DeLotelle et al. 1987), they prefer pines greater than 10 inches in dbh (USFWS 2003a). Groups may forage on pines scattered through hardwood stands, but pure hardwood stands are of little value to the RCW (Conner and O'Halloran 1987). The highest populations of the birds occur on areas with active

Biological Resources

Appendix H

prescribed burning programs that control hardwoods. Many complex and interrelated factors, such as condition of the understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season of the year, fire frequency and intensity, are important in determining foraging habitat quality.

The RCW is territorial and defends its home range from adjacent groups (Hooper et al. 1982; Ligon 1970). Territories tend to be smaller in areas with few hardwoods, presumably because of higher quality habitat. Home range size is related to both habitat and demographic (e.g., group size and population density) variables (Hooper et al. 1982; Lennartz et al. 1987) and is inversely related to habitat quality (DeLotelle et al. 1987, 1995). Studies by Hardesty et al. (1997a) and James et al. (2001) suggest that habitat structure, and not just the quantity of total resources, is an important determinant of home range size, territory quality, and reproductive success. The availability, quantity, and quality of foraging habitat affects RCW cluster status, group size, home range size, and reproductive success (Conner and Rudolph 1991; DeLotelle et al. 1987, 1995; Hardesty et al. 1997). Low-quality foraging habitat and large reductions in available foraging habitat can cause RCWs to abandon clusters, reduce fledging rates, and disrupt social interactions (Conner and Rudolph 1991; DeLotelle et al. 1995; Jackson and Parris 1995).

RCW Population dynamics

The recovery of the RCW is directly linked to the viability of discrete populations within selected southeastern states (USFWS 2003a). Populations required for recovery are distributed among 11 recovery units based on physiographic region to ensure the representation of broad geographic and genetic variation in the species. Viable populations within each recovery unit, to the extent allowed by habitat limitations, are essential to recovery of the species as a whole. Until recently, most RCW populations were considered stable at best or declining. RCW population trends since the early 1990s are improving, with an estimated 5,627 active RCW clusters range-wide (USFWS 2003a). The species can be delisted when five criteria are met that establish a tier of populations within the 11 recovery units that contain sufficient suitable nesting and foraging habitat and are not dependent on the installation of artificial cavities to remain stable.

Long-term viability of an RCW population, in genetic terms, depends on the presence of an adequate number of breeding individuals for the natural processes that increase genetic variability (e.g., mutation and recombination) to offset the natural processes that decrease genetic variability (e.g., genetic drift and inbreeding). Additionally, any prediction of a population's viability should also consider the population's ability to survive population fluctuations due to demographic and environmental fluctuations (Koenig 1988) or natural catastrophes. Reproductive rates, population density, and recolonization rates may influence RCW population variability more than mortality rates, sex ratios, and genetic viability. Therefore, dispersal of adult birds into breeding vacancies is essential for population persistence (Daniels et al. 2000; Schiegg et al. 2002). RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding males and females is high, ranging from 72 to 84 percent and 51 to 81 percent, respectively (Lennartz and Heckel 1987; Walters et al. 1988; DeLotelle and Epting 1992).

Appendix H

Biological Resources

Life history

The RCW has an advanced social system that revolves around family groups. A typical RCW group includes one pair of breeding birds, the current year's offspring (if any), and zero to four "helpers". Helpers are usually male offspring from previous breeding seasons that assist the breeding pair by incubating eggs, feeding the young, excavating cavities, and defending the territory (Ligon 1970; Lennartz and Harlow 1979; Lennartz et al. 1987; Walters et al. 1988). The RCW nesting season occurs from April to July. Incubation lasts approximately 9-10 days, and the young fledge 24 to 26 days after hatching. Some juvenile males disperse from their natal territory prior to the next breeding season in an attempt to find vacant territories, or to establish their own (Hooper et al. 1980; USFWS 2003a). Others may remain and become helpers during subsequent nesting seasons. Most juvenile females disperse after fledging, although some may remain with the group as helpers (Walters et al. 1988). The average dispersal distance of fledgling males and females is about three miles (Walters 1991; Letcher et al. 1998).

Each group of RCWs occupies a discrete territory consisting of its cavity trees, called a cluster, and adjacent foraging habitat (Walters 1990). The RCW requires mature (usually 60 or more years old), live pine trees to excavate its nesting and roosting cavities. The cavity trees are essential to the RCW because they provide shelter and a place to nest and raise young (Ligon 1970). A typical cluster contains between one and 20 cavity trees, and the breeding male usually chooses the most recently excavated natural cavity as the nest tree, or selects cavity trees with higher resin yields (Conner and Rudolph 1989). Such cavity trees may enhance the survival of the nestlings by decreasing the parasite load of nestlings and incubating adults, and providing a resin barrier to snake predation.

RCW cluster stands are typically less dense than surrounding stands and may be the least dense stands available (USFWS 2003a). For clusters, basal areas as low as 40 feet²/acre in longleaf stands and from 40 to 60 feet²/acre in shortleaf/loblolly stands are suitable (Conner et al. 1991). Seedtree and shelterwood cuts with excessive pine or hardwood midstory, however, are not acceptable as nesting habitat. Once established, clusters are often utilized for many consecutive years or even decades (Walters 1990). Hardwood midstory lessens the habitat quality, eventually leading to cavity abandonment when the hardwood midstory reaches cavity height (Conner and O'Halloran 1987; Costa and Escano 1989). Cluster abandonment may also occur as a result of displacement by competing cavity dwellers, or stochastic events such as hurricanes (Conner and O'Halloran 1987).

RCWs scale and probe bark on the trunks and limbs of living pine trees while foraging for insects. The amount of foraging area used by a group is dependant upon the quality of the habitat and population density. Research indicates that birds generally forage within one-half mile of the cluster (USFWS 2003a). RCW home ranges may vary seasonally, and encompass 60 to 300 acres. Habitat typically consists of open pine and/or pine/hardwood forests. Although in some habitats RCWs will use smaller pine trees as foraging substrate (DeLotelle et al. 1987), they prefer pines greater than 10 inches in dbh (USFWS 2003a). Groups may forage on pines scattered through hardwood stands, but pure hardwood stands are of little value to the RCW (Conner and O'Halloran 1987). The highest populations of the birds occur on areas with active

Biological Resources

Appendix H

prescribed burning programs that control hardwoods. Many complex and interrelated factors, such as condition of the understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season of the year, fire frequency and intensity, are important in determining foraging habitat quality.

The RCW is territorial and defends its home range from adjacent groups (Hooper et al. 1982; Ligon 1970). Territories tend to be smaller in areas with few hardwoods, presumably because of higher quality habitat. Home range size is related to both habitat and demographic (e.g., group size and population density) variables (Hooper et al. 1982; Lennartz et al. 1987) and is inversely related to habitat quality (DeLotelle et al. 1987, 1995). Studies by Hardesty et al. (1997a) and James et al. (2001) suggest that habitat structure, and not just the quantity of total resources, is an important determinant of home range size, territory quality, and reproductive success. The availability, quantity, and quality of foraging habitat affects RCW cluster status, group size, home range size, and reproductive success (Conner and Rudolph 1991; DeLotelle et al. 1987, 1995; Hardesty et al. 1997). Low-quality foraging habitat and large reductions in available foraging habitat can cause RCWs to abandon clusters, reduce fledging rates, and disrupt social interactions (Conner and Rudolph 1991; DeLotelle et al. 1995; Jackson and Parris 1995).

RCW Population dynamics

The recovery of the RCW is directly linked to the viability of discrete populations within selected southeastern states (USFWS 2003a). Populations required for recovery are distributed among 11 recovery units based on physiographic region to ensure the representation of broad geographic and genetic variation in the species. Viable populations within each recovery unit, to the extent allowed by habitat limitations, are essential to recovery of the species as a whole. Until recently, most RCW populations were considered stable at best or declining. RCW population trends since the early 1990s are improving, with an estimated 5,627 active RCW clusters range-wide (USFWS 2003a). The species can be delisted when five criteria are met that establish a tier of populations within the 11 recovery units that contain sufficient suitable nesting and foraging habitat and are not dependent on the installation of artificial cavities to remain stable.

Long-term viability of an RCW population, in genetic terms, depends on the presence of an adequate number of breeding individuals for the natural processes that increase genetic variability (e.g., mutation and recombination) to offset the natural processes that decrease genetic variability (e.g., genetic drift and inbreeding). Additionally, any prediction of a population's viability should also consider the population's ability to survive population fluctuations due to demographic and environmental fluctuations (Koenig 1988) or natural catastrophes. Reproductive rates, population density, and recolonization rates may influence RCW population variability more than mortality rates, sex ratios, and genetic viability. Therefore, dispersal of adult birds into breeding vacancies is essential for population persistence (Daniels et al. 2000; Schiegg et al. 2002). RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding males and females is high, ranging from 72 to 84 percent and 51 to 81 percent, respectively (Lennartz and Heckel 1987; Walters et al. 1988; DeLotelle and Epting 1992).

Appendix H

Biological Resources

Although the relationship between RCW population variability and density is not well understood, recent studies indicate spatial distribution of territories is important in long-term population stability. Conner and Rudolph (1991) found that, in sparse populations, RCW group size and the number of active clusters decreased as fragmentation increased. Hooper and Lennartz (1995) suggested that populations with less than 4.7 active clusters within 1.25 miles on average had critically low densities that inhibited population expansion. Results from a spatially explicit simulation model of RCW population dynamics suggest that population growth rate may depend more on the number and spatial distribution of territories, than on the initial composition of the population (Letcher et al. 1998). Achieving a self-sustaining population required fivefold more territories when territories were randomly spaced than when they were maximally clumped, and populations with as few as 49 territories were stable when those territories were highly aggregated. Populations of more maximally aggregated groups are likely to persist over the short term (i.e., 20 years) (Crowder et al. 1998).

Natural population growth (i.e., without recruitment clusters) occurs at extremely low rates (one to two percent per year) in this species (Walters 1991) and the availability of cavity trees is limiting (Copeyon 1990; Allen 1991). New groups or new territories arise by two processes, pioneering and budding (Hooper 1983). Pioneering is the occupation of vacant habitat by construction of a new cavity tree cluster and is relatively rare. Budding is the splitting of a territory, and the cavity tree cluster within it, into two. Budding is more common than pioneering in RCWs, since the new territory contains cavities from the outset (USFWS 2003a). Inactive clusters are important to maintaining extant populations of RCWs and may provide a short-term opportunity to enhance habitat available to RCWs, and thus increase the number of groups in populations (Doerr et al. 1989). After a territory is abandoned for two or more years, however, it is almost never reoccupied, typically because cavities are unsuitable due to deterioration or hardwood encroachment (Beckett 1971; Conner and Locke 1982; Copeyon et al. 1991).

However, the technology to create new territories at desired locations exists and management for optimum territory clumping is, therefore, possible (Letcher et al. 1998). Artificial cavities can be installed in unoccupied habitat that is otherwise suitable (Copeyon 1990; Allen 1991), with subsequent occupancy by dispersing birds, typically subadults (Carrie et al. 1999; Conner et al. 1999). Adding artificial cavities to sites already occupied increases group size (Carrie et al. 1999). Artificial cavities provide additional roosting opportunities for subadult males, encouraging them to remain in their natal clusters and potentially inherit the territory (Carrie et al. 1999). Females may also benefit when additional cavities are provided because they are the most subordinate members of the RCW social group, and therefore, may not always be able to secure adequate roost cavities.

Inducing the formation of RCW groups in restored habitat with artificial cavities is an established and successful technique (Copeyon et al. 1991; Walters et al. 1992; Gaines et al. 1995; Watson et al. 1995). Within one year of restoring habitat and providing artificial cavities at 20 unoccupied territories in the Sandhills of North Carolina, 90 percent of the sites were occupied by RCWs (Copeyon et al. 1991). Translocating RCWs is another method successfully used to establish new groups (Rudolph et al. 1992; Allen et al. 1993; Hess and Costa 1995; Costa

Biological Resources

Appendix H

and Kennedy 1994; Franzeb 1999). Translocation can include augmenting a solitary-bird group or translocating a pair of subadult RCWs [i.e., unrelated male and female (Costa and Kennedy 1994)]. Franzeb (1999) found that 63.2 percent of translocated birds (including adults and juveniles) remained at the release site for at least 30 days and 51.0 percent reproduced.

Status and distribution

The RCW was listed as endangered due to documented declines in local populations and massive reduction in foraging and nesting habitat. The life history of RCWs is closely tied to the occurrence of fire-maintained old growth pine forests that once dominated the southeastern United States. Only three million acres of longleaf pine forest remain of the estimated 60 to 92 million acres once in existence (Frost 1993). Timber clearing for agriculture, short timber rotations, and the suppression of fire reduced the amount and quality of RCW foraging and nesting habitat.

At the time of listing, the total number of individuals had declined to less than 10,000 in widely scattered and isolated populations (USFWS 2003a). Most RCW populations, regardless of location or land ownership, were considered stable at best, but more likely declining (Costa 1995). Costa and Escano (1989) documented RCW population declines in at least 10, and perhaps as many as 17 populations on National Forests. James (1995) estimated that the number of active clusters range-wide declined 23 percent between the early 1980s and 1990. Recently, numerous RCW populations have increased, particularly on Federal lands, as a result of management activities.

In 2003, it was estimated that 14,068 RCWs inhabited 5,627 active clusters across 11 States in the southeast United States (USFWS 2003a). National Forests (NF), military installations, and National Wildlife Refuges (NWR) contain the majority of extant populations and most of the habitat that is potentially suitable for RCWs. Conservation of RCWs as a species will depend on prudent management of habitats on those Federal lands. National Forests support the majority of the core populations required for delisting of the species, and therefore, have a uniquely important role in the species' recovery. Prior to the 1980s, most populations on National Forests were declining, but management efforts during the past decade, especially prescribed burning and cavity management, stabilized most of those populations and led to increases in some (USFWS 2003a).

Military installations have experienced similar increases in RCW populations: Eglin Air Force Base (Moranz and Hardesty 1998), Camp Lejeune Marine Corps Base, Fort Benning and Fort Stewart, Georgia (unpubl. Army data). The OCP states that Eglin has the second largest RCW population on military lands, behind only Fort Bragg in total number of active clusters. Eglin AFB is the only Air Force installation with more than 50 clusters of RCWs; Avon Park is the only other Air Force installation with more than 10 active clusters. The Service expects that most populations on Federal properties will eventually increase as proven management techniques and ecosystem management programs are implemented.

The Service, in response to the apparent range-wide decline of the species on private lands, developed a private lands conservation strategy that has been aggressively implemented,

Appendix H

Biological Resources

modified as necessary based on new scientific findings, and regularly evaluated to ensure objectives are being achieved. The RCW recovery objectives of the private lands strategy are to increase the acreage of private land habitat being managed for RCWs, maintain or increase the larger existing RCW population on private lands, rescue RCW groups from private lands that would be lost as a result of demographic and/or genetic uncertainty, foster and develop cooperative partnerships between and among Federal, State, and private parties responsible for and/or interested in RCW recovery, and increase the size of designated recovery and support populations while pursuing those objectives (Costa 1995). To achieve those strategic objectives, the Service implements three types of agreements involving private landowners: Safe Harbor Agreements, Habitat Conservation Plans (HCPs), and "no-take" management plans implemented via Memoranda of Agreement (Costa 1995).

The Service has issued four Biological Opinions within the Service's Panama City, Florida Field Office area of responsibility for adverse impacts to the RCW. These are described in **Table 3**. No critical habitat is designated for the RCW.

Table 3. Biological Opinions within the USFWS Panama City Office Boundaries that have been issued for adverse impact to the RCW.

OPINIONS ¹ (yr/number)	SPECIES	NUMBERS (amount of Take issued)	HABITAT	
			Critical Habitat	Habitat
2005/1	RCW-EAFB Operational Component Plan- allows removal of surplus groups once recovery goal is achieved.	Up to 125 groups	N/A	N/A
2006/3	RCW-NF in Florida; NWR in SE for prescribed fire; Safe Harbor Enhancement of survival permit to state of Florida;	28 cavity trees; 2 cavity trees; undetermined amount.	N/A	N/A
TOTAL		155+	N/A	N/A

¹ Year/Number of Opinions.

Analysis of the species likely to be affected

This biological opinion is focused on the potential for activities identified in the Environmental Impact Statement for 2005 BRAC Decisions and Related Actions at Eglin AFB to impact multiple RCW groups. Potential effects include the loss of foraging and potential nesting habitat related to construction activities, habitat fragmentation, decreased habitat quality from increased prescribed fire restrictions, and harassment in the form of disturbing or interfering with RCWs attempting to nest, forage, roost and immigrate/emigrate within the project Action Area.

Biological Resources

Appendix H

ENVIRONMENTAL BASELINE**Status of the species within the action area**

The Service considers Eglin AFB as 1 of 13 designated primary core populations (and 1 of 3 primary core populations in the East Gulf Coastal plain) needed for recovery of the species (USFWS 2003a). The Recovery Plan defines a primary core population as one that will harbor at least 350 potential breeding groups (PPGs) at the time of and after delisting (USFWS 2003a).

Prior to 1990, Eglin's Natural Resource staff conducted limited RCW surveys, mostly in response to mission activities. As a result, little was known about Eglin's RCW population. From 1990 to 1994, managers allocated resources to surveying only unsurveyed habitat and did not resurvey known clusters. The number of distinct separate and abandoned clusters observed on Eglin indicated that the population was in a state of decline (Hardesty et al. 1997b). During this time, newly discovered clusters were added to the installation's records as they were discovered. Therefore, records added prior to 1994 do not represent an increase in the RCW population, but rather an increase in knowledge about the population. By 1994, 95 percent of Eglin's estimated suitable RCW habitat was surveyed, and 217 active clusters containing 169 breeding pairs were documented. The Eglin Natural Resources Section uses records from 1994 as the population baseline for future monitoring and management actions.

In addition to a declining population, inventory data also revealed two subpopulations, sufficiently isolated from one another such that their population dynamics are largely independent (Walters et al. 2000). To properly address the needs of the distinct subpopulations, NRS divided the Reservation into two regions, East and West. The western subpopulation was deemed relatively stable with 184 active clusters, so a less intensive management strategy was pursued, emphasizing ecosystem management. The eastern subpopulation had only 33 active clusters and was in a critical state of decline. Intensive management was required to reverse this downward trend. Artificial cavity recruitment cluster construction was initiated in 1993 (Hardesty et al. 1997b) on the eastern and central portions of the Reservation. A donor population was developed within the more stable western subpopulation, and subadult pairs and single birds are still being used to fill suitable breeding vacancies in the eastern subpopulation. In addition to ecosystem management measures, intensive mechanical hardwood control and sand pine removal was initiated within the eastern subpopulation area.

Between 1995 and 2000, the RCW population growth rate averaged 6 percent annually, and the overall population increased by 31 percent. Annual population growth rates ranged from 2 percent in less intensively managed non-critical areas to 12 percent in the most intensively managed areas. Social structure also improved, lessening the potential for a demographic collapse within the eastern subpopulation; however, in 2002, this subpopulation was not considered stable (Walters 2000).

From 2000 through 2005, population growth slowed considerably (Figures 4 and 5). However, the RCW population on Eglin grew during 2006 and 2007 at a rate that is consistent with

Appendix H

Biological Resources

meeting recovery goals. Currently, Eglin's population is at **366** active clusters. The average increase in active clusters over the past 13 years is 4.1% and has ranged from 0 to 7.8% (**Figure 4**).

Eglin's NRS, through consultation with the Service (USFWS 2005), have established two categories of population goals. The Installation Regional Recovery Goal (IRRG) is the number of RCW groups identified by the Service as the installations contribution to regional recovery. The RCW Recovery Plan (USFWS 2003) has established this goal at 350 PPGs. A PPG is defined as an adult female and adult male that occupy the same cluster whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young (USFWS 2003).

In larger RCW populations such as Eglin, which cannot be sampled completely in one year, the number of PPGs can be estimated by sampling the number of active clusters. The Recovery Plan specifies that the number of active clusters is generally 1.1 to 1.4 times the number of PPGs. Thus an estimated 400 to 500 active clusters is necessary to contain 350 PPGs. This ratio of active clusters to PPGs in any particular population depends upon the proportion of solitary males, captured clusters (a cluster that does not support its own group of RCW but contains active cavity trees in use or kept active by birds from neighboring cluster), and also on the estimated error of the sampling scheme of the population. Eglin AFB's specific data for the years 1996 to 2003 indicate that a population of **437 active clusters can sustain 350 PPGs**. This determination is made with the anticipation that approximately 20 percent of all clusters will be captured or occupied by solitary males and is well within Recovery Plan guidance. Future monitoring conducted at Eglin over time could result in an adjustment of the target of active clusters needed to sustain 350 PPGs.

In addition to the IRRG goal of 350PPG/437active clusters, Eglin's RCW Operational Component Plan establishes a Mission Flexibility Goal (MFG). The MFG is a target that exceeds the recovery goal to provide for mission flexibility. **The MFG is established at 450 PPGs or 562 active clusters (Figure 5).**

[This area intentionally left blank.]

Biological Resources

Appendix H

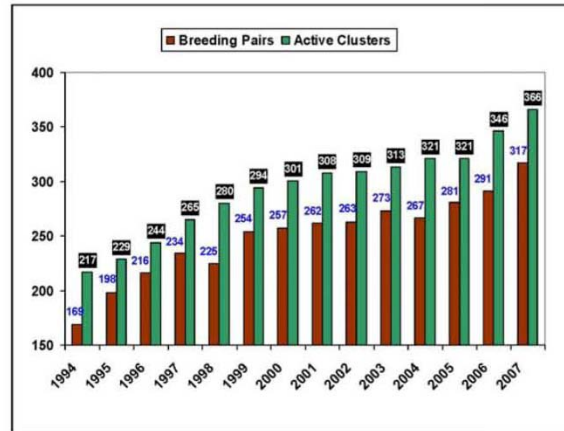


Figure 4. Eglin's Current Breeding Pairs and Active Clusters.

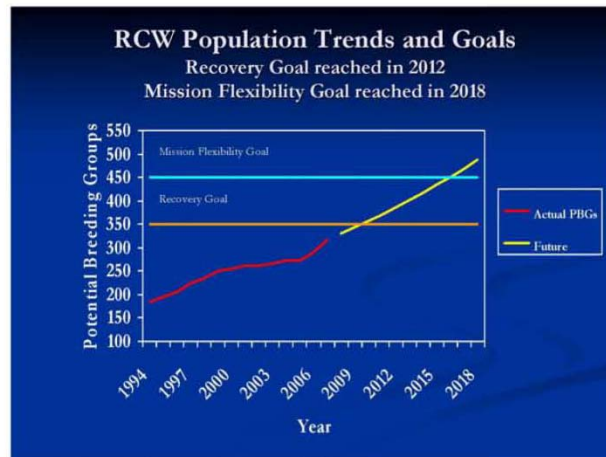


Figure 5. Eglin Recovery Goal and Mission Flexibility Goal.

Appendix H

Biological Resources

Factors affecting species environment within the action area

Within the Action Area, the Service has identified two categories of factors that ultimately affect the status and distribution of the RCW. These two categories are: 1) Mission Impacts and, 2) Habitat Loss/Degradation.

1. Mission Impacts: Mission activities likely have the most significant impacts on the RCW and its habitat. Mission activities on Eglin can be sub-divided into two broad categories; testing activities (as well as other operations involving aircraft) that occur on and around established test areas (such as, but not limited to bombing ranges) and ground exercises involving troop and vehicle maneuvers and live fire training that may occur on test areas, firing ranges, and throughout the reservation's interstitial areas.

Potential impacts resulting from testing operations include noise impacts from aircraft or munitions, expenditure of chemical materials through the use of munitions, chaff, flares and grenades, and escaped wildfires burning cavity trees and nests or impacting foraging habitat. Impacts from testing operations are described in detail in Eglin's August 2004 *Biological Assessment for Air to Ground Gunnery Exercises for Test Area A-77, A-78, A-79, and B-7* (U.S. Air Force 2004a). Based upon implementation of the avoidance and minimization measures identified in the BA, the Service concurred with Eglin's determination of "Not Likely to Adversely Affect" for the air to ground gunnery exercises (U.S. Air Force 2004b).

Ground exercises involving troop and vehicle movement may lead to impacts from noise and habitat degradation. Impacts could result from troop and vehicle travel within RCW buffer zones, hand digging of hasty individual fighting positions, firing of small arms, .50 caliber blanks, other artillery and hand grenades, use of smoke grenades, simulators and flares, bivouacking, and establishing command posts. Ground training involving pyrotechnics may ignite wildfires which could damage or destroy RCW cavity trees. Impacts from ground movement are described in detail in the March 2003 Environmental Assessment (EA) and accompanying BA (U.S. Air Force 2003; U.S. Air Force 2003a) for the Amphibious Ready Group Marine Expeditionary Unit (ARG/MEU) Readiness Training Exercise and corresponding Biological Opinion issued by the Service on April 15, 2003 (USFWS 2003). Avoidance and minimization measures identified in the ARG/MEU BA (U.S. Air Force 2003a) include, (but are not limited to) adherence to the 1996 U.S. Army Guidelines for the RCW on Army Installations (U.S. Army 1996, updated in Army, 2006). An important aspect of the Army Guidelines is the recognition of a 200 foot buffer zone around RCW clusters where certain activities such as bivouacking, excavating, tree removal, establishing command posts and use of certain munitions and firearms are prohibited. Certain transient activities (those of less than two hours in duration) through buffer areas such as foot traffic and vehicle use of existing roads is permitted (U.S. Army 1996, updated 2006).

2. Habitat Loss/Degradation: Loss of habitat and habitat degradation due to development, construction, and maintenance of buildings, facilities, roads, and new ranges or range expansion may have an impact on the RCW population in the action area. These activities

Biological Resources

Appendix H

could result in a loss of foraging habitat or loss of potential or actual cavity trees. Increasing development near RCW trees may also result in a reduction in prescribed burning, which would lead to the degradation of foraging habitat for the RCW.

Sand pine encroachment within the Sandhills vegetative community can also result in habitat loss. Sand pine is the biggest threat to the health and management of Eglin's Sandhills community (U.S. Air Force 2003). In the absence of frequent fire, this native invasive pine rapidly colonizes a site, reproduces as early as five years, and quickly modifies the fuel bed to reduce the efficacy of future prescribed burns. Monitoring data and research have conclusively shown that sand pine represents the greatest threat to Eglin's Sandhills ecosystem, and thus the greatest long-term threat to RCW recovery (U.S. Air Force 2003b).

EFFECTS OF THE ACTION

Factors to be considered

The proposed action has the potential to impact the RCW from direct physical impacts, noise and human presence (ground operations, munitions use, and air operations), and habitat impacts (land clearing, fire suppression, road improvements, and wildfires). Effects on RCWs that could result in take in the form of harassment from both timber clearing and construction include demographic disturbance due to habitat fragmentation causing potential dispersal impediments. Cumulatively, these stressors have the potential to negatively affect certain RCW clusters, primarily in the 7SFG(A) cantonment and Group 1 range area, where RCWs will be subject to the combination of land clearing, fire suppression, wildfires, noise, and human presence. Changes in the ability to meet long-term and short-term recovery goals were based on examination of current population density and pre- and post-project habitat capabilities and are summarized at the end of the section **Species' response to the proposed action**.

Proximity of action: The action will occur within and near active and inactive clusters and foraging habitat (**Figure 6**).

Distribution: BRAC activities that may impact RCWs, RCW trees, and RCW foraging habitat on Eglin AFB include the 7SFG(A) cantonment area, 7SFG(A) SOF ranges, 7SFG(A) infrastructure, 7SFG(A) ground training areas, JSF cantonment area, JSF flight paths, JSF munitions drop test areas, and the surrounding interstitial areas (**Figure 6, 7 and 8**).

Timing: BRAC activities within RCW habitats will take place throughout the year, including the RCW nesting season (April-July). RCWs are non-migratory birds, so activities during any time of the year have the potential to affect RCW behavior. Activities during the nesting season increase the possibility of disturbance to nesting RCWs. Ground training, munitions use, cantonment activities, and flight training will occur year-round. Land clearing and construction will only occur during the initial phase of BRAC activities, but may take place at any time of the year. Due to closures associated with ground training, munitions use, and cantonment activities, prescribed burning in these areas may be restricted during portions of the year, and in some cases, throughout the year.

Appendix H

Biological Resources

Nature of the effect: The effects of the activity may alter RCW nesting and foraging behavior, and may result in the damage or destruction of active and inactive trees in wildfires. Foraging habitat and inactive trees will be cleared for cantonment and range areas, and certain areas of foraging habitat may become degraded from reduced and restricted management to the point that they can no longer support RCWs. Increased fragmentation between the eastern and western RCW populations will occur.

Duration: The clearing from the 7SFG(A) cantonment area is a one time occurrence and expected completion is within 2 years. BRAC activities will have a long-term presence at Eglin. This could result in regular disturbance to the RCW populations within the training areas. Degradation of RCW foraging habitat due to fire suppression will be a gradual process, stretching over many years. Cavity tree mortality as a direct or indirect result of the wildfires will affect individual RCWs over a longer period. The duration of this effect will depend on how soon suitable cavities become available nearby to replace those that are lost. We expect long term, if not permanent, increased fragmentation between Eglin's eastern and western populations of RCWs.

Disturbance frequency: We expect short-term disturbance from construction activities within the cantonment areas. We expect RCWs to experience occasional decreased nesting and hatching success from any repeated disturbance, resulting from training activities conducted near active trees during the nesting season. We expect decreased reproductive success in 7SFG(A) SOF range area and the area adjacent and east of the 7SFG(A) cantonment area as restricted and reduced management (regular prescribed fire) are expected. The frequency of closures would increase over the current level with a likely decrease in burning frequency.

Disturbance intensity and severity: Areas to be cleared for the SOF ranges, 7SFG(A) cantonment area and associated infrastructure will severely affect RCW connectivity on a local scale from direct clearing and reduced management within adjacent clusters. However, each of the impacted clusters will retain many acres of quality foraging habitat. The flight paths and test areas used for munitions drops are already in use for Eglin missions, but would be used more intensively with the introduction of JSF flight training. Decreased prescribed burning near the 7SFG(A) cantonment area, SOF ranges, and ground training areas due to safety concerns and closures would lead to a gradual degradation in RCW foraging habitat and may ultimately make these areas unsuitable foraging habitat.

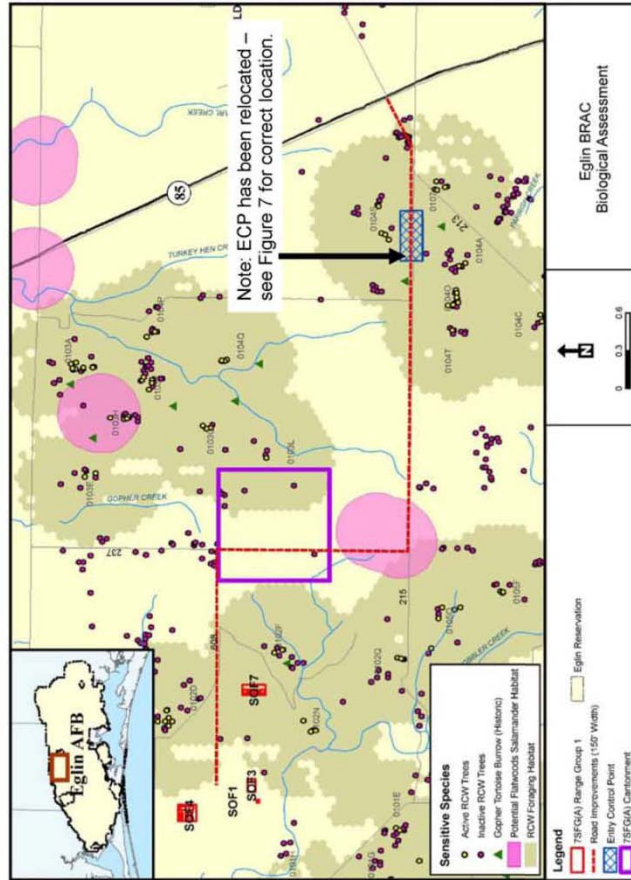


Figure 6. Sensitive Species at 7SFG(A) Cantonment and Group 1 SOF Range Locations.

Appendix H

Biological Resources

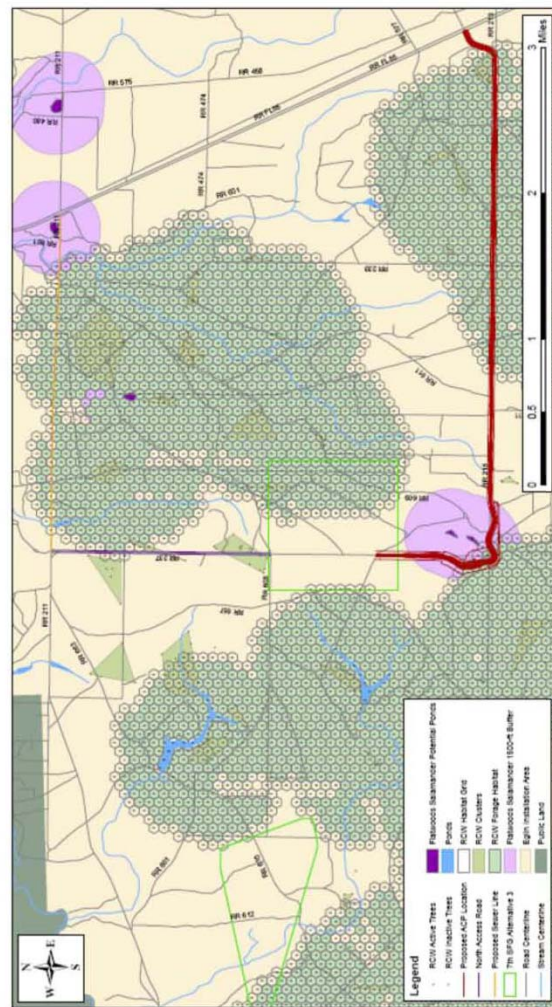
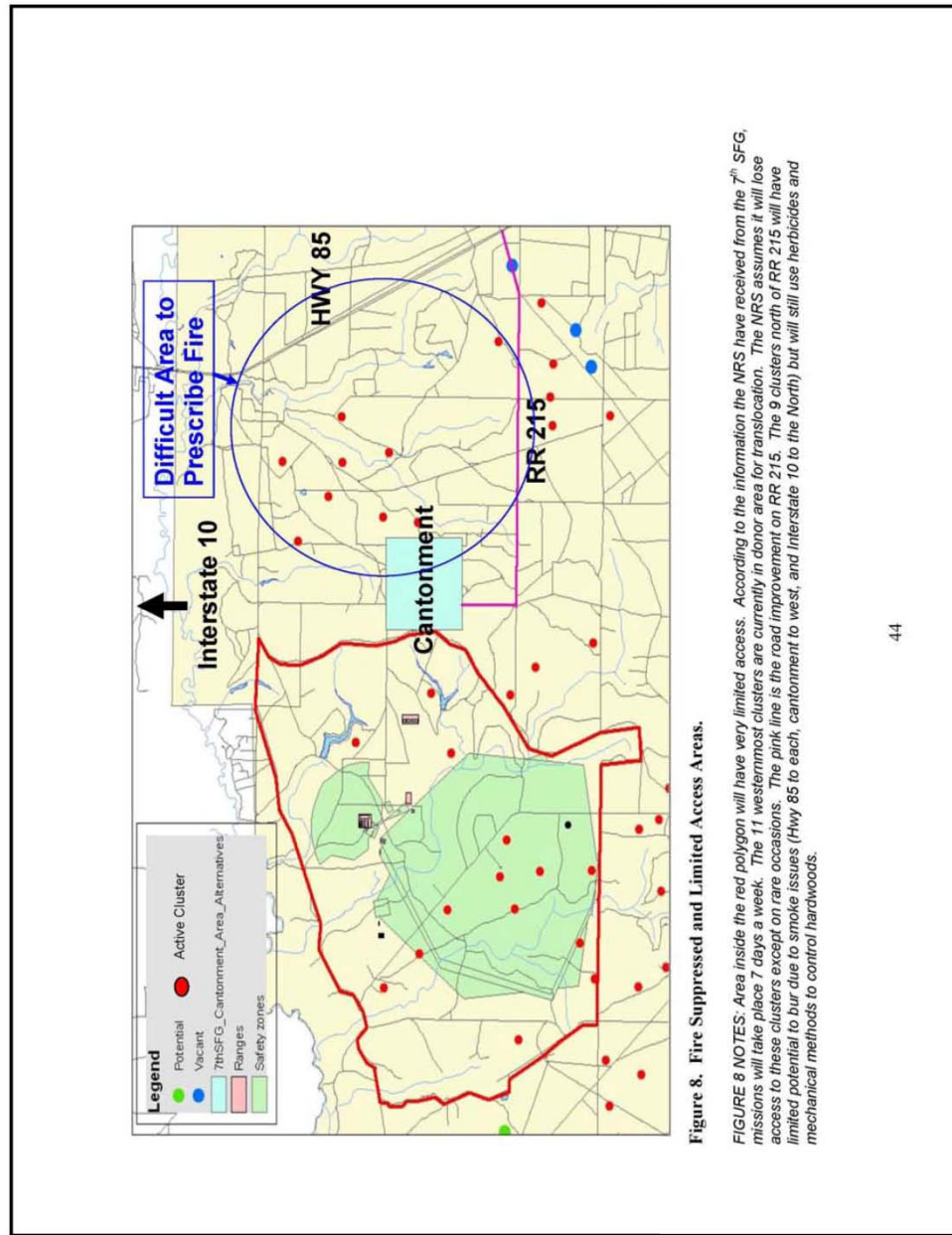


Figure 7. Road Improvements, ACP, Sewer Line, and Sensitive Species Locations.



Appendix H

Biological Resources

Analyses for effects of the actionDirect effects**Direct Physical Impacts to the RCW**

The potential exists for an RCW cavity tree to be hit by munitions used during 7SFG(A) activities on the SOF ranges, JSF strafing at TA B-75 and TA C-62, and JSF bombing at TA B-82 and TA C-52E. No RCW trees are within the impact zones for JSF munitions, thus there is limited potential for direct physical impacts to active cavity trees at any of the four test areas. Where there is a high risk of projectile damage to foraging or nesting habitat, range layout will be modified/shielded to protect RCW foraging and nesting habitat (U.S. Army 2006).

Pyrotechnics and munitions have the potential to impact RCW health if ingested or accumulated in soils and water. Potential effects on RCWs from the use of flares are inhalation of flare ash and ingestion of or contact with the chemical constituents of flares. The toxic effects of flare ash residue were tested on mammals, plants, and fish with concentrations of flare ash representing the high range that would be found in a pyrotechnic test area. Results indicated that the effects of flare ash residue are very minimal and not particularly dangerous to the environment (U.S. Air Force 1997). The resultant addition of chemical constituents of flares is not of sufficient quantities to change soil, water, or air chemistry.

RCWs could be potentially exposed to dye-colored smoke through inhalation, ingestion, direct contact, or bioconcentration. The most likely opportunity for such exposure will be immediately after the smoke has been dispelled, but since RCWs will most likely leave the immediate area during training exercises, the likelihood of direct exposure to toxic levels of emissions will be low. Ingestion or inhalation of particles in sufficient amounts to cause harm is unlikely because of the wind-driven distribution of smoke particles.

To minimize potential impacts, the 7SFG(A) and JSF will follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army 2006), and the avoidance and minimization measures that are a part of the proposed action.

Harassment

RCWs may be affected by noise and human presence associated with 7SFG(A) cantonment and range operations and JSF range operations. Indirect impacts to RCWs could occur from the physical presence of personnel or equipment within foraging habitat, or from noise associated with munitions, vehicle, or aircraft use. Impacts could include changes in nesting behavior and feeding. Certain training activities may disrupt the ability of RCWs to roost or nest (or conduct nesting activities such as incubating, brooding, feeding) if conducted in proximity to cavity trees. Vehicle movements and other training activities near RCW clusters will potentially create noise and disturbance that could affect the RCW. Delaney et al. (2002) monitored nesting RCWs as a convoy of vehicles passed; birds did flush as a result of the passing of the convoy but returned shortly thereafter (10 minutes). Vehicle use associated with 7SFG(A) training along existing

Biological Resources

Appendix H

roadways does not represent a novel noise and disturbance source such that RCWs would abandon the area. Birds near these areas are likely acclimated to the presence of vehicles.

Annual updates of *Eglin's Threatened and Endangered Species Component Plan* identify the current number of clusters subject to training restrictions. The NRS will coordinate with the 46 Test Wing (TW) and Service to determine locations of protected clusters based on biologically sound principles to reduce risk of disturbance, demographic isolation, and habitat fragmentation, while minimizing effects on training operations. Protected clusters subject to training restrictions include active clusters (captured clusters, solitary birds, and PBGs) and currently inactive recruitment clusters in areas of the Eglin reservation where training will occur. All current and future recruitment clusters with the "supplemental" designation are exempt from training restrictions regardless of population status (U.S. Air Force 2006).

For protected clusters in areas of the Eglin reservation where training will occur, buffers for all suitable cavity or cavity start trees will be marked. RCW trees will be marked prior to any field maneuvering training by the 7SFG(A). Warning signs will be posted and will be constructed of durable material, ten inches square (oriented as a diamond), white or yellow in color. The RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 3/8-inch in height. Warning signs will be posted at reasonable intervals along the 200-foot perimeter of cavity trees facing to the outside of the buffer zone and along roads, maintained trails and firebreaks, and other likely entry points into the buffer zone.

Eglin follows the *Management Guidelines for the Red-Cockaded Woodpecker on Army Installations* which details activities that are allowed and those that are restricted near active RCW trees (U.S. Army 2006). Military training within 200 feet of marked cavity trees is limited to military activities of a transient nature (less than two hours occupation), and military vehicles are prohibited from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road or maintained trail or firebreak. Prohibited activities within the 200-foot buffer include bivouacking, excavating, digging, and establishing command posts.

Land clearing, large machinery operation, and construction may disturb individuals or clusters. Foraging RCWs may avoid areas where construction is occurring. Pioneering RCWs may be affected by noise from daily operations and not colonize or immigrate to new areas near the cantonment site. This could affect the growth of the RCW population around the proposed cantonment area. Loud noises during nesting season (April – July) may affect RCW reproduction. Certain range roads in proximity to RCW foraging habitat would have an increased amount of traffic both during construction and daily operations, potentially creating noise levels that would affect RCWs.

Suitable habitat appears to outweigh any negative influences associated with noise due to construction or military bombing. Observations have indicated that many animals become adapted to human activities and noises (Busnel 1978). Scientists who have researched the effects of noise on wildlife report that animals may initially react with a startle effect from noises, but

Biological Resources

Appendix H

roadways does not represent a novel noise and disturbance source such that RCWs would abandon the area. Birds near these areas are likely acclimated to the presence of vehicles.

Annual updates of *Eglin's Threatened and Endangered Species Component Plan* identify the current number of clusters subject to training restrictions. The NRS will coordinate with the 46 Test Wing (TW) and Service to determine locations of protected clusters based on biologically sound principles to reduce risk of disturbance, demographic isolation, and habitat fragmentation, while minimizing effects on training operations. Protected clusters subject to training restrictions include active clusters (captured clusters, solitary birds, and PBGs) and currently inactive recruitment clusters in areas of the Eglin reservation where training will occur. All current and future recruitment clusters with the "supplemental" designation are exempt from training restrictions regardless of population status (U.S. Air Force 2006).

For protected clusters in areas of the Eglin reservation where training will occur, buffers for all suitable cavity or cavity start trees will be marked. RCW trees will be marked prior to any field maneuvering training by the 7SFG(A). Warning signs will be posted and will be constructed of durable material, ten inches square (oriented as a diamond), white or yellow in color. The RCW graphic and the lettering "Endangered Species Site" and "Red-cockaded Woodpecker" will be printed in black. The lettering "Do Not Disturb" and "Restricted Activity" will be printed in red. All lettering will be 3/8-inch in height. Warning signs will be posted at reasonable intervals along the 200-foot perimeter of cavity trees facing to the outside of the buffer zone and along roads, maintained trails and firebreaks, and other likely entry points into the buffer zone.

Eglin follows the *Management Guidelines for the Red-Cockaded Woodpecker on Army Installations* which details activities that are allowed and those that are restricted near active RCW trees (U.S. Army 2006). Military training within 200 feet of marked cavity trees is limited to military activities of a transient nature (less than two hours occupation), and military vehicles are prohibited from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road or maintained trail or firebreak. Prohibited activities within the 200-foot buffer include bivouacking, excavating, digging, and establishing command posts.

Land clearing, large machinery operation, and construction may disturb individuals or clusters. Foraging RCWs may avoid areas where construction is occurring. Pioneering RCWs may be affected by noise from daily operations and not colonize or immigrate to new areas near the cantonment site. This could affect the growth of the RCW population around the proposed cantonment area. Loud noises during nesting season (April – July) may affect RCW reproduction. Certain range roads in proximity to RCW foraging habitat would have an increased amount of traffic both during construction and daily operations, potentially creating noise levels that would affect RCWs.

Suitable habitat appears to outweigh any negative influences associated with noise due to construction or military bombing. Observations have indicated that many animals become adapted to human activities and noises (Busnel 1978). Scientists who have researched the effects of noise on wildlife report that animals may initially react with a startle effect from noises, but

Appendix H

Biological Resources

adapt over time, so that even this behavior is eradicated (Busnel 1978). Based on the fact that the RCW population continues to grow at Eglin, including areas in close proximity to test areas, it appears that they have adapted to all of the noises associated with the military mission, including supersonic booms. Noise from proposed construction will have less impact than other activities that already occur on the Reservation.

Munitions noise may also affect the RCW through changes in nesting behavior and feeding. In a study at Fort Stewart, RCWs did not flush (i.e., take flight) when the distance of small arms fire was greater than 152.4 meters and the noise level was less than 80 dB. The distance between a 7SFG(A) range and the closest active RCW tree is over 400 meters. Overall, Delaney et al. (2002) found that military training exercises of short duration (less than two hours) conducted near active RCW cavity trees did not significantly affect the ability of the individuals to successfully reproduce. Activity longer than two hours was not tested.

Ordinance noise is categorized as high-explosive impulse noise, such as occurs from live bombs or artillery. The sound and pressure of a detonation can temporarily or permanently affect hearing, injure or kill an animal depending on the proximity of the animal to the source. Inert and live bombs (Guided Bomb Unit [GBU]-12) will be dropped by the JSF on existing targets on TA B-82 and TA C-52E. Potentially harmful levels of noise could extend outward to active cavity trees. Although brief, exposure to this noise carries a risk of acoustic discomfort. Noise impacts to RCWs could result in non-lethal harassment. RCWs will be most sensitive during nesting season (01 April to 01 July); noise could directly affect eggs and could cause nest abandonment by adults.

The RCW is nesting successfully in close proximity to TA B-82 and on TA C-52E, where munitions use already occurs. Similar exposures are likely occurring on occasion throughout these test areas and other test areas on the Reservation with no known detrimental impacts on the overall population. Eglin NRS personnel have observed no difference in RCW productivity or survival from those clusters located near an active range or those far away. Compared to noise, habitat quality seems to be more influential in determining RCW productivity, survival and population stability (U.S. Air Force 2007).

Noise impacts from large-caliber weapons (20-millimeter and above) have been studied at Fort Stewart, Georgia. Delaney et al. (2002) noted that RCWs did not leave their nests when large-caliber weapons noise was greater than 700 meters away. Observations closer than 500 meters were not made. The noise level was measured at 102 dB (unweighted sound exposure level [SEL]). The closest targets to active RCW trees on TA C-62 and TA B-75 are 1,200 and 1,000 meters away, respectively.

A small number of road improvements such as asphalt or widening are planned to provide proper access to the 7SFG(A) cantonment area and ranges. Construction noise associated from road improvements may affect RCWs temporarily. As discussed previously, compared to noise, habitat quality seems to be more influential in determining RCW productivity, survival and population stability (U.S. Air Force 2007). Temporary noise from road improvements will not

Biological Resources

Appendix H

impact RCWs provided the road workers follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army 2006), and the avoidance and minimization measures that are a part of the proposed action to reduce the potential for noise impacts to the RCW.

Aircraft noise from JSF training has the potential to affect the RCW. Most commonly, the reaction of birds to aircraft noise, particularly when the aircraft is visible to the animal, is some degree of startle response, one response being flushing (i.e., abruptly leaving a nest) (Gladwin et al. 1988). In this case, a bird could theoretically leave its nest open to predation, thereby affecting reproductive success (Larkin 1996).

Low-level flights over RCWs would expose the birds to high SEL levels. The noise and visual presence associated with these low-level flights have the potential to impact RCWs, particularly during nesting season (April to June) when birds may be flushed from their nests, possibly affecting reproductive success. However, brooding birds are less likely to respond to noise with a flight response than roosting birds, and the average time away from the nest after a noise-induced flight was less than five minutes (Bowles et al. 1995).

Delaney et al. (2002) measured responses of the RCW to low-level aircraft noise at Fort Stewart. Researchers did not see a flight response when helicopters were greater than 30 meters from nests and the noise level was less than 102 SEL. Fixed-wing aircraft did not elicit a flushing response when located further than 600 meters (0.38 mile) away with noise levels less than 90 SEL. However, the study did not test for RCW response at distances less than 600 meters or at noise levels greater than 90 SEL, so it is possible that RCWs could tolerate louder, closer noises. The 600-meter, 90-SEL measurement should not be viewed as an absolute threshold, only as an example of conditions during which the RCW did not flush.

At the airfields where takeoffs and landings would occur, the nearest RCW foraging habitat is approximately 1,610 meters (1 mile) from Duke Field, 9,660 meters (6 miles) from Choctaw Field, and 4,830 meters (3 miles) from Eglin Main Base. On the Eglin Range, RCWs southeast of Duke Field may be exposed to high SEL levels during JSF takeoffs, landings, and touch and go-type operations. Due to the orientation of flight paths, no RCWs should be affected by F-35 flights in the Choctaw Field and Eglin Main Base areas.

Restricted airspace at Eglin Range areas (R-2914 A/B, R-2915 A/B/C, and R-2919 A/B) allows military flights to ground level. However, JSF aircraft in these areas are not expected to fly at altitudes lower than 500 feet AGL and would generate noise levels similar to those generated on the lowest segments of VR-1082 and VR-1085. Currently, the F-15 aircraft flies as low as 500 feet AGL; and C-130, V-22 and various types of helicopters fly at altitudes less than 500 feet AGL in these areas.

Birds that live near airfields and under established flight paths are likely accustomed to the types of noise disturbance produced by aircraft, and in some cases it appears that the presence of suitable habitat outweighs the disturbance of loud noises (U.S. Air Force 2007). While introduction of the F-35 will increase the noise and activity levels at the airfields and along

Appendix H

Biological Resources

existing flight paths, increases will be gradual, allowing birds to acclimate to the noise. RCWs may exhibit a temporary flight response initially until they become accustomed to the increased noise levels.

To minimize potential impacts, the 7SFG(A) and JSF will follow the *Management Guidelines for RCWs on Army Installations* (U.S. Army 2006), and the avoidance and minimization measures that are a part of the proposed action.

Habitat Impacts

An independent Oracle-based Geographic Information System (GIS) tool (model) has been developed as a foraging habitat assessment tool for Eglin to estimate the available foraging resources without sampling the entire Reservation (U.S. Air Force 2006). Eglin NRS has consulted with the Service on the guidelines for the habitat conditions and foraging requirements for RCWs on Eglin. Eglin NRS personnel use the guidelines identified in the *Threatened and Endangered Species Component Plan* (U.S. Air Force 2006) when determining whether consultation with the Service is required. Table 4 (Foraging Habitat Variable Standards for Red-cockaded Woodpeckers) is a comparison of the current Recovery Plan foraging standards and Eglin specific standards.

Table 4. Foraging Habitat Variable Standards for Red-cockaded Woodpeckers.

Measure	USFWS Recovery Standard (public lands)	USFWS Managed Stability Standard (private lands)	Eglin Recovery Standard	Eglin Managed Stability Standard
Acres	200-300	75	300	150
Density (stems per acre)	18 > 14 in dbh	None	20 > 10 in dbh	None
Density total (stems per foraging area)	None	None	6,000 > 10 in dbh	3,000 > 10 in dbh
Basal Area (ft ² per acre)	20 > 14 in dbh	40-70 > 10 in dbh	20 > 10 in dbh	None
Basal Area total (ft ²)	None	3,000 > 10 in dbh	6,000 > 10 in dbh	4,000 > 10 in dbh
Distance from cluster	0.5 mile	0.25 mile	0.5 mile	0.3 mile
Midstory height	7 ft	7 ft	7 ft	7 ft
Ground cover	>40% herb	None	> 40% herb	None

> = greater than; < = less than; dbh = diameter at breast height; ft² = square feet; in = inch

The first column contains the values defined in the Recovery Plan as the Recovery Standard for public lands. The second column contains the values defined in the Recovery Plan as the Managed Stability Standard for private lands in order to protect existing groups (USFWS 2003a). The last two columns are recommendations for Eglin's Recovery Standard and Managed Stability Standard. A No Effect determination would be made if a cluster's foraging resources exceed Eglin's Recovery Standard after the completion of a proposed action. A Not Likely to Adversely

Biological Resources

Appendix H

Affect determination would be made if a cluster's foraging resources fall between Eglin's Recovery Standard and Eglin's Managed Stability Standard after the completion of a proposed action. A Likely to Adversely Affect determination would be made if a cluster's foraging resources fall below Eglin's Managed Stability Standard after the completion of a proposed action. Also, if the proposed action affects less than one percent of the foraging resources, and the foraging resources are above Eglin's Managed Stability Standard, then no consultation would be required.

The proposed action may impact RCW habitat from tree clearing, road improvements, fire suppression, and wildfire. Land clearing activities within RCW foraging habitat at the proposed 7SFG(A) cantonment area and 7SFG(A) Group 1 ranges will result in the loss of RCW foraging habitat.

Based on the calculations of the Eglin RCW model, the foraging habitat loss to RCW clusters 102F and 101B from tree clearing for the Group 1 ranges will be 10.2 acres and 2.0 acres, respectively (Table 5). As shown in Table 5, 502.8 acres (Cluster 102F) and 582 acres (Cluster 101B) of foraging habitat will remain, which is above the Managed Stability Standard and the Recovery Standard (NRS GIS 2007; U.S. Air Force, 2006). The foraging habitat loss to cluster 103L from the tree clearing for the 7SFG(A) cantonment area will be up to 173 acres, leaving 255 acres of foraging habitat, which is above the Managed Stability Standard and below the Recovery Standard for Eglin (NRS GIS 2007; U.S. Air Force, 2006) (Table 5). Even through the foraging habitat loss to cluster 103L from the tree clearing for the 7SFG(A) cantonment area will leave 255 acres of foraging habitat according to Eglin's model, the entire western portion of the foraging habitat may be cleared affecting the dispersal and available habitat near the cluster (see Figure 6). Also, the cluster would be within 150 meters of the edge of the cantonment which would have personnel, vehicles, and construction noise which may also cause harassment issues with this cluster along with loss of foraging habitat. It is estimated that this cluster would be the only cluster affected by the land clearing and the cluster would be negatively affected and "take" to that cluster would be anticipated. All other land clearing (i.e. road improvements) would remove a small percentage of available habitat and no "take" would be expected on all clusters except 103L due to habitat clearing.

[This area intentionally left blank.]

Appendix H

Biological Resources

Table 5. Acres of RCW Foraging Habitat Cleared.

Location	Cluster	Foraging Habitat Cleared (Acres) ¹	Foraging Habitat Remaining (Acres)
7SFG(A) Group 1 Ranges	102F	10.2	502.8
	101B	2	582
7SFG(A) Cantonment	103L	173	255
Range Road 215 Improvement East of Cantonment	107J	15.5	374
	104S	49.5 acres	506.5
	104O	5	249
	104T	8.5	303
Range Road Improvement West of Cantonment	102D	10	616
	102F	10	495

¹Shows maximum acreage potentially cleared NRS GIS, 2007

A small number of road improvements such as asphalt or widening are planned to provide proper access to the 7SFG(A) cantonment area and ranges. Road improvements have the potential to remove foraging habitat. Only a small portion of foraging habitat may be lost to each cluster (**Table 5**), and the closest active RCW tree is located over 200 meters from the proposed road improvements. All criteria will be above the Recovery Standards set for the Eglin RCW population except for clusters 103L and 104O (U.S. Air Force 2006).

Up to 28 inactive RCW trees may be cleared for BRAC ranges, cantonment areas, and munitions storage (**Table 6**). The inactive trees to be cleared for the Group 2 ranges and the MSA are located at least five miles from the nearest active RCW tree, and no good foraging habitat is located near the trees. RCWs do not fly this great a distance, particularly with no foraging habitat available. If tree clearing is to occur during nesting season, Eglin will screen each inactive cavity tree during the breeding season to verify no trees have been recolonized.

Table 6. Maximum Number of Inactive RCW Trees to be Cleared.

Location	Inactive RCW Trees Cleared (Max #)
7SFG(A) Cantonment	9
7SFG(A) Group 2 Ranges Near TA C-52W	3
JSF MSA	16

Biological Resources

Appendix H

Munitions use at the 7SFG(A) SOF ranges, JSF strafing at TA B-75 and TA C-62, JSF bombing at TA B-82 and TA C-52E, and flare use at various locations over the Eglin Range will increase the number of wildfires. Additionally, increases in mission activity at the ranges will make it more difficult to conduct prescribed fires, resulting in a likely increase in the number and intensity of wildfires. Wildfires can be both beneficial and harmful to native species and habitats. Fires under the proper conditions have a beneficial effect on RCW habitat by maintaining good quality understory conditions. However, wildfires may result in negative impacts to RCW habitat and RCW cavity trees in areas that have not been burned within the last few years or if fires occur under dry conditions. Such conditions result in "hot" fires that could damage normally fire-resistant longleaf pines, and could result in the destruction of RCW cavity trees and trees used for foraging. The test areas where JSF live munitions use will occur have been used for years as bombing and strafing ranges. These test areas have regular mission-related fires which keep fuel levels low and hot fires to a minimum. These test areas have good RCW habitat around them, as demonstrated by the number of RCW clusters in the surrounding areas.

The 7SFG(A) and JSF will work with the NRS to develop Wildfire Operational Plans to identify high wildfire risk conditions and notification procedures that units will follow to engage fire response personnel when needed. Munitions and pyrotechnics use will follow Eglin's Wildfire Specific Action Guide Restrictions (U.S. Air Force 2006) which rate fire danger from low to extreme. During days with low fire danger, there are no restrictions on missions, but on days with extreme fire danger, no pyrotechnics are allowed without prior approval from the Wildland Fire Program Manager at the Eglin NRS. These restrictions during extreme fire danger will reduce the likelihood of a mission-induced wildfire. Avoidance and minimization measures will reduce the potential for impacts to RCWs; however, even with implementation of these measures, additional wildland fire positions will be needed to respond to the increased number of wildfires.

As stated previously, increased mission activity at TA B-75, TA C-62, TA B-82, and TA C-52E will limit the ability of the NRS to conduct prescribed burns. In addition, development of the 7SFG(A) cantonment area and Group 1 ranges in the middle of a fire-dependent sandhills habitat will limit the ability of the NRS to conduct prescribed burns in the area. While wildfires may sometimes provide beneficial results in fire-adapted habitats, they just as easily can cause damage if they burn too hot; thus, prescribed fire is the preferred method for managing RCW foraging habitat in the Sandhills. Eglin NRS will not be able to burn the area as frequently or as well due to smoke management problems with the cantonment area and ranges. The Eglin NRS will prioritize prescribed fire as resources allow, however, the quality of the RCW foraging habitat around the 7SFG(A) cantonment area and Group 1 ranges would likely degrade if there is fire suppression, with no alternative means (herbicides or mechanical) to control midstory vegetation. A decrease in the frequency of prescribed fires (to reduce fuel loads) may also lead to an increase in the number and severity of wildfires surrounding the ranges, which have the potential to damage RCW cavity trees.

Appendix H

Biological Resources

Although the proposed action may limit the ability of the NRS to conduct prescribed burns in the area, through coordination with 7SFG(A) and mission personnel, it may be possible to conduct enough burns in the area to continue RCW habitat maintenance. Additional manpower would be required to burn these areas and to coordinate with 7SFG(A) personnel at the cantonment area and ranges. Alternate means of controlling undergrowth are also available and could be used in burn restricted area. These methods include using specific herbicides that target understory or midstory vegetation and mechanical means. The methods may maintain the open understory preferred by RCWs but data show that productivity declines with just the use of herbicides (Hess 2007). RCWs will be impacted due to the difficulty in conducting prescribed fire and associated degradation of the habitat over time.

If the 7SFG(A) uses Group 1 ranges daily, as proposed, then the Eglin NRS will lose access to that area for monitoring and will have to drop 11 clusters from Eglin's donor area. This will lower Eglin's ability to translocate birds to the eastern subpopulation or to other partners in the Southern Range Translocation Cooperative. Also, Eglin will lose about six potential cluster sites, which may in the short term affect Eglin's ability to reach recovery since this area already has suitable habitat and other areas will need to wait for habitat management.

Eglin will continue to implement guidelines for habitats throughout the Reservation to maintain and improve potentially suitable habitat for the RCW. Guidelines prohibit the cutting of pine trees unless previously approved by NRS biologists. Units will be instructed to immediately report to range control known damage to any marked cavity or cavity start tree and/or any known extensive soil disturbance in and around RCW clusters; range control will notify NRS biologists immediately. Within three working days of notification, the Eglin NRS will reprovision a cavity tree if one is destroyed due to training activity. If a unit causes damage to training land within a cluster, the responsible unit will coordinate with the NRS to repair damage as soon as practicable (normally within three working days of notification). All digging for military training activities in RCW habitat management units will be filled and inspected upon completion of training. Training guidelines will be actively enforced through training and natural resources enforcement programs, prescribed in chapters 1 and 11 of Army Regulation 200-3 (U.S. Army 1995), and installation range regulations.

Species' response to the proposed action

This biological opinion is based on effects that are anticipated to the RCW (adult RCWs, young RCWs, active RCW trees, inactive RCW trees, foraging habitat) as a result of: 1) land clearing of foraging habitat and inactive trees, 2) the physical presence of humans, equipment, and vehicles within foraging habitat, 3) noise from munitions, aircraft, equipment, humans, and vehicles in foraging habitat, 4) wildfires damaging or destroying active RCW trees, and 5) degradation of RCW foraging habitat due to increased difficulty in conducting prescribed fire.

Land clearing may directly affect up to 284 acres of foraging habitat for nine RCW clusters, and up to 28 inactive RCW trees may be cleared for BRAC ranges, cantonment areas, and munitions

Biological Resources

Appendix H

storage; no active RCW trees will be cut. Habitat degradation associated with the difficulty in conducting prescribed fire may affect approximately 14,900 acres of foraging habitat and 66 active trees within the BRAC footprint. Ground training activities, and associated noise and human presence, would occur over a 53,592 acre area and may disturb RCWs residing there; however, implementation of the 2006 Army Guidelines will minimize this potential. Noise associated with munitions and aircraft may disturb RCWs; however, the presence of quality habitat appears to outweigh any harassment impacts from noise.

Due to the importance of the Eglin's RCW population regionally (Eglin is a core population (USFWS 2003), reductions in quality foraging habitat may affect future growth potential because Eglin would not be able to put recruitment clusters in previously designated areas, potentially delaying Eglin's population recovery. Eglin will likely lose the ability to use targeted clusters as donors for translocation. If a comparable donor site, providing a similar number of birds for translocation, is not located, Eglin's rate of growth as well as partners in the Southern Regional Translocation Cooperative may be affected.

Nine clusters located east of the proposed cantonment area, north of RR 215 (Figure 8), west and adjacent to Hwy 85 and south of I-10 are threatened by reductions in the ability to conduct prescribed fire. Reductions in prescribed fire may negatively affect these nine RCW clusters (2.5 birds per cluster = 22.5 birds) on Eglin through group isolation, habitat fragmentation, habitat degradation, and loss of foraging habitat, but group demography, population level, and recovery unit level would not be affected. The nine clusters and their associated foraging habitat provide potential connectivity between the east and west subpopulations.

Localized loss of habitat, degradation of habitat, or noise impacts to the RCW can have a cumulative impact when viewed on a regional scale if that loss or impact is compounded by other events with the same end result. Analysis of potential impacts has identified minimal potential for noise impacts to the RCW, provided user groups implement management actions and regulatory requirements (i.e., 2006 Army Guidelines). RCWs near existing Eglin test areas appear to be acclimated to the loud noises associated with the test areas, with the presence of quality habitat being a greater determinant of cavity tree location than noise.

Eglin AFB has the largest RCW population in the western portion of the Florida Panhandle, with 366 active clusters. Together with Blackwater River State Forest and Conecuh National Forest, there are over 400 active clusters in the western Florida Panhandle. Direct land clearing for BRAC would impact less than 0.1% of the 210,000 acres managed for RCWs on Eglin. Additionally, Blackwater and Conecuh maintain approximately 28,000 acres of foraging habitat, and are actively restoring additional acreage to create potential RCW habitat. Up to 17 inactive RCW trees may be cut for BRAC and 1 inactive tree for the ALARNG SARC; however, there are almost 4,300 inactive RCW trees on Eglin. Regionally, the loss of 18 inactive RCW trees and less than 200 acres of RCW foraging habitat would not significantly impact RCWs.

Although upcoming land clearing would directly affect only a small portion of Eglin (approximately one percent), far-reaching indirect impacts may occur due to increased mission

Appendix H

Biological Resources

activity (7SFG(A), JSF, and other user groups), new construction in previously undeveloped fire-dependent habitats, and continued development in the communities surrounding Eglin and other areas with RCW populations (i.e., Conecuh National Forest). The primary cumulative impact to RCWs would be related to reductions in prescribed fire. The RCW is dependent on fire to maintain quality habitat. The long-term effectiveness of alternate management techniques such as mechanical or chemical understory control is uncertain, but would be employed in RCW foraging habitat where prescribed burning was restricted.

Due to the importance of the Eglin RCW population regionally (Eglin is a core population), reductions in quality foraging habitat may affect future growth potential because Eglin would not be able to put recruitment clusters in previously designated areas, potentially delaying Eglin's population recovery. Also, Eglin would likely lose the ability to use a number of clusters as donors for translocation, which may affect not only the potential for Eglin's population to grow but also other partners in the Southern Regional Translocation Cooperative because Eglin may not be able to provide as many birds for translocation.

Cumulatively, reductions in prescribed fire may negatively affect RCWs through group isolation, habitat fragmentation, habitat degradation, and loss of foraging habitat, but group demography, population level, and recovery unit level would not be affected. Although negative impacts would occur to RCWs, overall, upcoming BRAC actions would not be significant. Implementation of management actions, regulatory requirements, and an increase in Eglin AFB prescribed fire support would further reduce the potential for negative impacts to the RCW.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the Action Area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this opinion because they require separate consultation pursuant to section 7 of the ESA.

Towns surrounding the Eglin AFB continue to expand which increases potential management restrictions, mostly in the form of limited abilities to conduct necessary prescribed burning. Frequency and intensity of fires may be restricted which further reduces potential or optimal RCW foraging habitat, whether for existing or expanding clusters.

CONCLUSION

After reviewing the current status of the RCW, the environmental baseline for the Action Area, the effects of the proposed BRAC actions and the cumulative effects, it is the Service's biological opinion that the BRAC actions, as proposed, are not likely to jeopardize the continued existence of the RCW. No critical habitat has been designated for this species, therefore, none will be affected.

Biological Resources

Appendix H

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by Eglin AFB so that they become binding conditions of any grant or permit issued to the participants of each action, as appropriate, for the exemption in section 7(o)(2) to apply. Eglin AFB has a continuing duty to regulate the activity covered by this incidental take statement. If Eglin AFB (1) fails to assume and implement the terms and conditions or (2) fails to require the participants of each action to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Eglin AFB must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(I)(3)]

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Construction associated with the proposed BRAC actions will remove 284 acres of suitable and potentially suitable foraging habitat from nine active RCW territories with cluster 103L losing approximately 173 acres of suitable habitat. The Service anticipates that no direct take of individual or group of RCWs or their cavity trees will occur as a result of this project. The Service recognizes that some of the effects of the action on RCWs, when evaluated one cluster at a time, would not rise to the level of take based on effects to individual clusters and groups. However, the combined effects of habitat loss within the affected territories associated with the project may affect the function of the 11 clusters to the west of the proposed cantonment area by reducing connectivity with the nine clusters to the east of the proposed cantonment area. The primary effects of this take are the diminished ability for demographic exchange of an undetermined number of individual RCWs between the western and eastern clusters by interjecting cantonment and range areas in the middle as well as diminished habitat management from decreased or removal of prescribed fire throughout approximately 14,900 acres.

Appendix H

Biological Resources

Since no direct effects are expected to any cluster, the "take" is considered primarily in the form of harassment. Cluster 103L is the only cluster that could be distinguished under Harm due to the proximity of the cantonment area and removal of 173 acres of foraging habitat to the west of the cluster. This is considered a significant habitat modification and may result in impairing behavioral patterns such as feeding or sheltering. All of the nine clusters would be affected in the form of harassment due to a likely reduction in prescribed fire which could create a less favorable habitat condition for the clusters over time and disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Table 7 estimates the number of individuals affected by the BRAC actions. Eglin AFB has an average of 2.5 RCWs per cluster so clusters potentially affected are multiplied by 2.5 to best estimate number of individuals affected by the BRAC actions.

Incidental take is expected to be in the form of:

- (1) harm due to loss of foraging habitat from timber clearing for construction including loss of foraging habitat due to intraspecific competition;
- (2) harassment from the initial disturbance from construction;
- (3) harm from the diminished potential to use prescribed burning to maintain ecological functions in foraging habitat;
- (4) harassment from demographic isolation of clusters; and
- (5) harassment from disrupted dispersal due to habitat fragmentation caused by the project footprint.

The Service expects 9 RCW groups could be taken as a result of this proposed action. The incidental take is expected to be in the form of harm and harassment.

Table 7. The estimated number of individuals and habitat affected for the proposed project, based on the best available commercial and scientific information.

SPECIES	INDIVIDUALS*	HABITAT AFFECTED	CH DESTROYED
RCW	22.5* (9 clusters)	14,900 acres	NA

* Individuals are estimated by using 2.5 individuals per cluster affected.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of expected take is not likely to result in jeopardy to the RCW. Critical habitat has not been designated for this species; therefore, the project will not result in destruction or adverse modification of critical habitat for the RCW.

Incidental take of RCWs is anticipated to occur temporarily during the construction of the cantonment area and road expansion and into perpetuity from restricted habitat management.

Biological Resources

Appendix H

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize incidental take of RCWs within the Action Area:

1. Eglin's NRS shall implement the Conservation Measures outlined in the the BA as summarized in this document which is more inclusive than the Applicant's BA.
2. Eglin's NRS shall implement measures to reduce the probability of wildfires.
3. Eglin's NRS shall protect and manage RCW foraging habitat to the extent possible.
4. Eglin's NRS shall ensure that the Terms and Conditions are accomplished and completed as detailed in this Incidental Take Statement, including completion of reporting requirements.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, Eglin AFB must comply with the following terms and conditions, which carry out the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Eglin's Natural Resource Staff shall determine the best placement for the buildings within the cantonment area while meeting military mission needs. Eglin's NRS should avoid Tier 1 and Tier 11 (as reference by Florida Natural Areas Inventory) longleaf pine habitats to the maximum extent possible while minimizing the footprint of disturbance to natural habitats to the extent possible.
2. Eglin's Natural Resource Staff shall work with the planning team to plan a "fire-wise", yet native plant, community within the cantonment area with the purpose of enabling prescribed fire up to and adjacent to the boundary of the cantonment area. Maintaining the maximum amount of longleaf pine trees within the cantonment area should also be given consideration during planning.
3. Provisions shall be taken during planning of buildings for construction within the cantonment area to include a "smoke-free" building to be used by those rangers sensitive to smoke (i.e. Asthmatics) that may be aggravated as a result of prescribed fire activities.
4. NRS shall apply necessary tactics, within reason, that will improve connectivity of the eastern and western RCW subpopulations on Eglin AFB through habitat management (fire and pine plantings) and cavity augmentation.
5. The 7SFG(A) and JSF shall work with the NRS to develop Wildfire Operational Plans to identify high wildfire risk conditions and notification procedures that units will follow to engage fire response personnel when needed.

Appendix H

Biological Resources

6. Munitions and pyrotechnics use shall conform to Eglin's Wildfire Specific Action Guide Restrictions, which rate fire danger from low to extreme.
7. Eglin NRS shall submit annual reports to the USFWS Panama City Field Office, 1601 Balboa Avenue, Panama City, FL 32405, describing actions taken to implement the Terms and Conditions of this Incidental Take Statement by January 15 of the following year of completing the proposed actions. This report shall also include information on the number of active cavity trees killed by wildfire, documented incidences of training related harassment or harm, number of acres of prescribed fire in RCW foraging habitat of the 9.0 clusters potentially impacted, and a description of the extent to which training activities limited RCW monitoring.
8. Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Fish and Wildlife Service Law Enforcement Office located in Clermont, Florida at (352) 429-1037 within 24 hours. Additional notification must be made to the Fish and Wildlife Service Ecological Services Field Office at Panama City, Florida at (850) 769-0552 and to the FWC at 1-888-404-3922. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than 22.5 RCWs will be incidentally taken (Table 8). If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Table 8. Summary of anticipated incidental take and estimated take following the implementation of the RPMs.

SPECIES	INDIVIDUALS	
	Project Take Level	RPM Take Level*
RCW	22.5	22.5

* The take level with implementation of the RPMs.

Biological Resources

Appendix H

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

1. Continue to participate in the NW Florida Greenway Initiative and consider funding a research project that would model optimal corridors that will maintain maximum biodiversity and connectivity throughout Eglin AFB to better plan for future mission impacts. Consideration should be given to providing east and west connectivity as well as north and south corridors.
2. During midstory control efforts using hexazinone, particularly during the use of the ULW formulation, continue to monitor the response of native ground cover to treatment. Both short-term and long-term native ground cover response should be monitored. Comparison should be made to the ground cover of untreated areas as well as areas receiving other types of midstory control.
3. Implement year around, bi-monthly monitoring and protection actions of the state protected snowy plover so that federal protection of this species is not required in the future. Annual surveys will allow the Service to review trends in the population.
4. Continue habitat protection (including signage where necessary), predator control, and track survey monitoring of the Santa Rosa beach mouse.
5. In order to comply with the MBTA¹ and potential for this project to impact nesting shorebirds, Eglin NRS should follow FWC's standard guidelines to protect against impacts to nesting shorebirds during implementation of this project during the periods from February 15 - August 31 of each year.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

The Migratory Bird Treaty Act (MBTA)

The Fish and Wildlife Service will not refer the incidental take of red-cockaded woodpecker for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712), if such take is in compliance with the terms and conditions specified here.

Appendix H

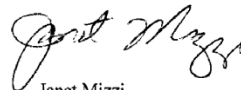
Biological Resources

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in this biological opinion. As written in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; [22.5 individuals over time] (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is later modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease until reinitiation.

The above findings and recommendations constitute the report of the Department of the Interior. If you have any questions about this opinion, please contact Patty Kelly, of our Panama City Field Office at (850) 769-0552 x228.

Sincerely,



Janet Mizzi
Deputy Field Supervisor

cc:

Will McDearman, RCW Coordinator, Jackson, MS
Robin Boughton, FWC, Avian Coordinator, Ocala, FL
Mary Ann Poole, FWC, Office of Policy and Stakeholder Coordination, Tallahassee, FL
Ken Graham, FWS, Ecological Services, Atlanta, GA (electronic version only)

¹ The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory bird. Under the provisions of the MBTA it is unlawful "by any means or manner to pursue, hunt, take, capture or kill any migratory bird except as permitted by regulations issued by the Fish and Wildlife Service. The term "take" is not defined in the MBTA, but the Service has defined it by regulation to mean to pursue, hunt, shoot, wound, kill, trap, capture or collect any migratory bird, or any part, nest or egg or any migratory bird covered by the conventions or to attempt those activities.

Biological Resources

Appendix H

LITERATURE CITED

- Allen, D. H. 1991. Constructing artificial red-cockaded woodpecker cavities. USDA Forest Service General Technical Report SE-73.
- Allen, D. H., K. E. Franzreb, and R. F. Escano. 1993. Efficacy of translocation strategies for red-cockaded woodpeckers. *Wildlife Society Bulletin* 21:155-159.
- Beckett, T. 1971. A summary of red-cockaded woodpecker observations in South Carolina. Pp. 87-95 in R. L. Thompson, ed. *Ecology and management of the red-cockaded woodpecker*. U.S. Bureau of Sport Fishing and Wildlife and Tall Timbers Research Station, Tallahassee, FL.
- Bowles, A. E., 1995. Responses of Wildlife to Noise. In *Wildlife and recreationists; coexistence through management and research*. Editors: Knight, R.L. and K.J. Gutzwiller. Pages 109-156.
- Busnel, R. G. 1978. Effects of noise on wildlife. National Institute for Agricultural Research, *Jouy-en-Josas*, 78, France.
- Carrie, N. R., R. N. Conner, D. C. Rudolph, and D. K. Carrie. 1999. Reintroduction and post release movements of red-cockaded woodpecker groups in eastern Texas. *Journal of Wildlife Management* 63:824-832.
- Conner, R. N. and B. A. Locke. 1982. Fungi and red-cockaded woodpecker cavity trees. *Wilson Bulletin* 94:64-70.
- Conner, R. N. and K. A. O'Halloran. 1987. Cavity-tree selection by red-cockaded woodpeckers as related to growth dynamics of southern pines. *Wilson Bulletin* 99:398-412.
- Conner, R. N. and D. C. Rudolph. 1989. Red-cockaded woodpecker colony status and trends on the Angelina, Davy Crockett and Sabine National Forests. U.S. Department of Agriculture Forest Service Research Paper SO-250.
- Conner, R. N. and D. C. Rudolph. 1991. Forest habitat loss, fragmentation, and red-cockaded woodpeckers. *Wilson Bulletin* 103:446-457.
- Conner, R. N., A. E. Snow, and K. A. O'Halloran. 1991. Red-cockaded woodpecker use of seed-tree/shelterwood cuts in eastern Texas. *Wildlife Society Bulletin* 19:67-73.
- Conner, R. N., D. C. Rudolph, R. R. Schaefer, D. Saenz, and C. E. Schackelford. 1999. Relationships among red-cockaded woodpecker group density, nestling provisioning rates, and habitat. *Wilson Bulletin* 111:494-498.

Appendix H

Biological Resources

- Copeyon, C. K. 1990. A technique for constructing cavities for the red-cockaded woodpecker. *Wildlife Society Bulletin* 18:303-311.
- Copeyon, C. K., J. R. Walters, and J. H. Carter III. 1991. Induction of red-cockaded woodpecker group formation by artificial cavity construction. *Journal of Wildlife Management* 55:549-556.
- Costa, R. 1995. Red-cockaded woodpecker recovery and private lands: a conservation strategy responsive to the issues. Pp. 67-74 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. *Red-cockaded woodpecker: recovery, ecology and management*. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- Costa, R. and R. Escano. 1989. Red-cockaded woodpecker: status and management in the southern region in 1986. US Forest Service Technical Publication R8-TP12.
- Costa, R. and E. Kennedy. 1994. Red-cockaded translocations 1989-1994: state of our knowledge. Pp. 74-81 in *Proceedings of the American Zoo and Aquarium Association*. Zoo Atlanta, Atlanta, GA.
- Costa, R. and J. Walker. 1995. Red-cockaded woodpecker. Pp. 86-89 in E. T. LaRoe, G. S. Farris, C. E. Puckett, and others, eds. *Our living resources: a report to the nation on The distribution, abundance, and health of U.S. plants, animals and ecosystems*. U. S. National Biological Survey, Washington, D. C.
- Crowder, L. B., J. A. Priddy, and J. R. Walters. 1998. Demographic isolation of red-cockaded woodpecker groups: a model analysis. USFWS Project Final Report. Duke University Marine Laboratory, Beaufort, NC, and Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Daniels, S. J., J. A. Priddy, and J. R. Walters. 2000. Inbreeding in small populations of red-cockaded woodpeckers: insights from a spatially-explicit individual-based model. Pp. 129-147 in Young, A. G. and G. M. Clarke, eds. *Genetics, demography and viability of fragmented populations*. Cambridge University Press, London, UK.
- Delaney D. K., L. L. Pater, R. H. Melton, B. A. MacAllister, R. J. Dooling, B. Lohr, B. F. Brittan-Powell, L. L. Swindell, T. A. Beaty, L. D. Carlile and E. W. Spadgenske, 2002. *Assessment of Training Noise Impacts on the Red-cockaded Woodpecker: Final Report February 2002*.
- DeLotelle, R. S. and R. J. Epting. 1992. Reproduction of the red-cockaded woodpecker in central Florida. *Wilson Bulletin* 104:285-294.
- DeLotelle, R. S., R. J. Epting, and J. R. Newman. 1987. Habitat use and territory characteristics of red-cockaded woodpeckers in central Florida. *Wilson Bulletin* 99:202-217.

Biological Resources

Appendix H

- DeLotelle, R. S., R. J. Epting, and G. Demuth. 1995. A 12-year study of red-cockaded woodpeckers in central Florida. Pp. 259-269 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- Doerr, P. D., J. R. Walters, and J. H. Carter III. 1989. Reoccupation of abandoned clusters of cavity trees (colonies) by red-cockaded woodpeckers. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 43:326-336.
- Franzreb, K. E. 1999. Factors that influence translocation success in the red-cockaded woodpecker. Wilson Bulletin 111:38-45.
- Frost, C. C. 1993. Four centuries of changing landscape patterns in the longleaf pine ecosystem. Pp. 17-44 in S. M. Hermann, ed. The longleaf pine ecosystem: ecology, restoration, and management. Tall Timbers Fire Ecology Conference Proceedings No. 18. Tall Timbers Research Station, Tallahassee, FL.
- Gaines, G. D., K. E. Franzreb, D. H. Allen, K. S. Laves and W. L. Jarvis. 1995. Red-cockaded woodpecker management on the Savannah River Site: a management/research success story. Pp. 81-88 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- Gladwin, D. N., K. M. Mancini, and R. Vilella, 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: Bibliographic Abstracts*. U.S. Fish and Wildlife Service, National Ecology Research Center. NERC-88/29. AFESC TR 88-14. 78 pp.
- Hardesty, J. L., K. E. Gault, and F. P. Percival. 1997. Ecological correlates of red-cockaded woodpecker (*Picoides borealis*) foraging preference, habitat use, and home range size in northwest Florida (Eglin Air Force Base). Final Report Research Work Order 99, Florida Cooperative Fish and Wildlife Research Unit, University of Florida, Gainesville, FL.
- Hardesty, J. L., K. E. Gault, and Percival, 1997a. Ecological Correlates of Red-cockaded Woodpecker (*Picoides borealis*) Foraging Preference, Habitat Use, and Home Range Size in Northwest Florida (Eglin Air Force Base). Final Report. Research Work Order 99. Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, Florida. June 30, 1997.
- Hardesty, J. L., K. E. Gault, and H. F. Percival, 1997b. Trends, Status and Aspects of Demography of the Red-cockaded Woodpecker (*Picoides borealis*) in the Sandhills of Florida's Panhandle, Part II. Florida Coop. Fish and Wildlife Ecology and Conservation, University of Florida, Gainesville, Florida.
- Hess, C.A. 2007. National Forest Service biologist and researcher on Apalachicola National Forest. Personal communication with Patty Kelly, USFWS. June 2007m.

Appendix H

Biological Resources

- Hess, C. A., and R. Costa. 1995. Augmentation from the Apalachicola National Forest: the development of a new management technique. Pp. 385-388 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- Hooper, R. G. 1983. Colony formation by red-cockaded woodpeckers: hypotheses and management implications. Pp. 72-77 in D. A. Wood, ed. Red-cockaded woodpecker symposium II. Florida Game and Fresh Water Fish Commission, Tallahassee, FL.
- Hooper, R. G. and M. R. Lennartz. 1995. Short-term response of a high density red-cockaded woodpecker population to loss of foraging habitat. Pp. 283-289 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- Hooper, R. G., A. F. Robinson, Jr., and J. A. Jackson. 1980. The red-cockaded woodpecker: notes on life history and management. USDA Forest Service General Report SA-GR-9.
- Hooper, R. G., L. J. Niles, R. F. Harlow, and G. W. Wood. 1982. Home ranges of red-cockaded woodpeckers in coastal South Carolina. Auk 99:675-682.
- Jackson, J. A. and S. D. Parris. 1995. The ecology of red-cockaded woodpeckers associated with construction and use of a multi-purpose range complex at Fort Polk, Louisiana. Pp. 277-282 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- James, F. C. 1995. The status of the red-cockaded woodpecker in 1990 and the prospect for recovery. Pp. 439-451 in D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.
- James, F. C., C. A. Hess, and B. C. Kicklighter. 2001. Ecosystem management and the niche gestalt of the red-cockaded woodpecker in longleaf pine forests. Ecological Applications 7:854-870.
- Koenig, W. D. 1988. On determination of viable population size in birds and mammals. Wildlife Society Bulletin 16:230-234.
- Larkin, R. P., 1996, *Effects of Military Noise on Wildlife: A Literature Review*, USACERL Technical Report 96/21, January, Center for Wildlife Ecology, Illinois Natural History Survey, Champaign, Illinois.

Biological Resources

Appendix H

- Lennartz, M. R. and R. F. Harlow. 1979. The role of parent and helper red-cockaded woodpeckers at the nest. *Wilson Bulletin* 91:331-335.
- Lennartz, M. R. and D. G. Heckel. 1987. Population dynamics of a red-cockaded woodpecker population in Georgia Piedmont loblolly pine habitat. Pp. 48-55 *in* R. R. Odom, K. A. Riddleberger, and J. C. Ozier, eds. *Proceedings of the third southeast nongame and endangered wildlife symposium*. Georgia Department of Natural Resources, Game and Fish Division, Atlanta, GA.
- Lennartz, M. R., R. G. Hooper, and R. F. Harlow. 1987. Sociality and cooperative breeding of red-cockaded woodpeckers (*Picoides borealis*). *Behavioural Ecology and Sociobiology* 20:77-88.
- Letcher, B. H., J. A. Priddy, J. R. Walters, and L. B. Crowder. 1998. An individual-based, spatially explicit simulation model of the population dynamics of the endangered red-cockaded woodpecker. *Biological Conservation* 86:1-14.
- Ligon, J. D. 1970. Behavior and breeding biology of the red-cockaded woodpecker. *Auk* 87:255-278.
- Moranz, R. A. and J. L. Hardesty, 1998. Adaptive Management of Red-cockaded Woodpeckers in Northwest Florida: Progress and Prospectives. Summary report of the 21-23 July 1998 workshop, Eglin Air Force Base. The Nature Conservancy, Gainesville, Florida.
- NRS GIS. 2007. Eglin Natural Resources Section Oracle Platform at 96 CEG CEVSN Servers. Eglin Air Force Base.
- Rudolph, D. C., R. N. Conner, D. K. Carrie, and R. R. Schaefer. 1992. Experimental reintroduction of red-cockaded woodpeckers. *Auk* 109:914-916.
- Schiegg, K., J. R. Walters, and J. A. Priddy. 2002. The consequences of disrupted dispersal in fragmented red-cockaded woodpecker *Picoides borealis* populations. *Journal of Animal Ecology* 71:710-721.
- U.S. Air Force. 2003. Amphibious Ready Group/Marine Expeditionary Unit Readiness Training Environment Assessment.
- U.S. Air Force. 2003a. Amphibious Ready Group/Marine Expeditionary Unit Readiness Training Biological Assessment.
- U.S. Air Force. 2003b. Red-cockaded Woodpecker Operational Component Plan, Eglin AFB, FL.
- U.S. Air Force. 2004. Standard Protection Measures for the Eastern Indigo Snake. Revised 12 February 2004.

Appendix H

Biological Resources

- U.S. Air Force. 2004a. Informal U.S. Fish and Wildlife Service Endangered Species Act Section 7 Consultation for the Air to Ground Gunnery A-77, A-78, A-79, and B-7 Programmatic Biological Assessment.
- U.S. Air Force. 2004b. *Air-to-Ground Gunnery: A-77, A-78, A-79, and B-7 Final Programmatic Environmental Assessment*. Department of the Air Force, Air Armament Center, Eglin Air Force Base, Florida. July 2004.
- U.S. Air Force. 2006. Eglin's Wildfire Specific Action Guide Restrictions.
- U.S. Air Force. 2006a. Threatened and Endangered Species Component Plan, Eglin AFB, FL. CEG/CEVSN.
- U.S. Air Force. 2007. *Integrated Natural Resources Management Plan (INRMP) 2007*. 96 CEG/CEVSN, Department of the Air Force, Eglin AFB, Florida. September 2007.
- U.S. Air Force. 2008. Draft Environmental Impact Statement for 2005 Base Realignment and Closure Decisions and Related Actions, Eglin AFB, FL.
- U.S. Army. 1995. Natural Resources Land, Forest, and Wildlife Management. Army Regulation 200-3. Headquarters, Department of the Army, Washington, DC.
- U.S. Army. 1996. Management guidelines for the red-cockaded woodpecker on Army installations. U.S. Department of the Army, Washington, DC.
- U.S. Army. 2006. Management guidelines for the red-cockaded woodpecker on Army installations (Updated). U.S. Army Headquarters, Washington, D.C.
- U.S. Fish and Wildlife Service (USFWS), 2003. Biological Opinion for U.S. Marine Corps Expeditionary Unit Training at Eglin AFB, FL. April 15, 2003.
- USFWS. 2003a. Revised recovery plan for the red-cockaded woodpecker (*Picoides borealis*): second revision. U. S. Fish and Wildlife Service, Atlanta, GA.
- USFWS. 2004. Air-to-Ground Gunnery Biological Opinion. U. S. Fish and Wildlife Service Panama City Field office, October 2004
- USFWS. 2005. Santa Rosa Island Mission Utilization Plan Biological Opinion, Eglin AFB, FL.
- Walters, J. R. 1990. Red-cockaded woodpeckers: a 'primitive' cooperative breeder. Pp. 69-101 in P. B. Stacey and W. D. Koenig, eds. Cooperative breeding in birds. Cambridge University Press, London, UK.
- Walters, J. R. 1991. Application of ecological principles to the management of endangered species: the case of the red-cockaded woodpecker. Annual Review of Ecology and Systematics 22:505-523.

Biological Resources

Appendix H

Walters, J. R., P. D. Doerr, and J. H. Carter III. 1988. The cooperative breeding system of the red-cockaded woodpecker. *Ethology* 78:275-305.

Walters, J. R., C. K. Copeyon, and J. H. Carter III. 1992. Test of the ecological basis of cooperative breeding in red-cockaded woodpeckers. *Auk* 109:90-97.

Walters, J. R., C. A. Haas, and K. E. Gault, 2000. Adaptive Management of Red-cockaded Woodpeckers on Eglin Air Force Base, Florida: Experimental Study.

Watson, J. C., R. G. Hooper, D. L. Carlson, W. E. Taylor, and T. C. Milling. 1995. Restoration of the red-cockaded woodpecker population on the Francis Marion National Forest: three years post-Hugo. Pp. 172-182 *in* D. L. Kulhavy, R. G. Hooper, and R. Costa, eds. Red-cockaded woodpecker: recovery, ecology and management. Center for Applied Studies in Forestry, Stephen F. Austin State University, Nacogdoches, TX.

Appendix H

Biological Resources

Panama City Field Office/P. Kelly/bas/c:public server/Patty/BRAC Final BO 7/11/08

Biological Resources

Appendix H

This page is intentionally blank.

H-296

2005 BRAC Decisions and Related Actions
Final Environmental Impact Statement
Eglin Air Force Base, Florida

October 2008

This page is intentionally blank.